Gatwick Airport Northern Runway Project

Consultation Report Appendices – Part B – Volume 3

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Preliminary Environmental Information Report

Preliminary Environmental Information Report
Non-Technical Summary

September 2021

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1 Introduction

1.1. Purpose of this Non-Technical Summary

1.1.1 This document is the Non-Technical Summary of the Preliminary Environmental Information Report (PEIR) prepared on behalf of Gatwick Airport Limited (GAL) for the proposal to make best use of Gatwick Airport's existing runways (referred to as 'the Project').

1.2. The Project

1.2.1 GAL is seeking permission for alterations to the existing northern runway at Gatwick Airport which, along with lifting the current restrictions on its use, would enable dual runway operations. The Project includes the development of a range of infrastructure and facilities which, together with the alterations to the northern runway, would enable GAL to increase its passenger throughput to 75.6 million passengers per annum by 2038. This would represent an increase of 13.2 million passengers per annum compared to the forecast throughput of 62.4 million passengers per annum in the absence of the Project. The site location is shown on Figure 1, with the boundary for the Project shown on Figure 2.

1.2.2 The Planning Act 2008, as amended, defines Nationally Significant Infrastructure Projects (NSIPs). Alterations to existing airports in England fall under the Planning Act 2008, as amended, where the alteration would exceed defined thresholds. The Project would fall within the definition of an alteration to Gatwick Airport and would meet the threshold for change in the number of passengers and would therefore represent an airport NSIP.

1.2.3 Alterations to existing highways also fall within the scope of the Planning Act 2008. The proposed highway improvements would involve the alteration of a highway where the speed limit is 50 mph or over and where the relevant area threshold of 12.5 hectares is exceeded. Therefore, the Project also includes works that constitute a highways NSIP in their own right.

1.2.4 As such there is a requirement to submit an application for development consent for the Project to the Planning Inspectorate to be decided by the Secretary of State.

1.2.5 The Planning Act defines the key stages in the application process for Nationally Significant Infrastructure Projects. These stages are summarised in Diagram 1. The Project is currently at the pre-application stage.

Diagram 1: Overview of the Application Process

1.3. Environmental Impact Assessment

1.3.1 At this time, a formal process of Environmental Impact Assessment (EIA) is ongoing to identify the likely environmental effects of the Project, both positive (beneficial) and negative (adverse).

1.3.2 The EIA process is being undertaken in accordance with the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017, as amended (referred to as the EIA Regulations). The PEIR presents the preliminary findings of the EIA process.

1.3.3 This summary document provides an overview of the PEIR in non-technical language. The PEIR, including this Non-Technical Summary, forms part of the consultation material prepared by GAL as part of the pre-application process.

1.3.4 Details of how to view the full PEIR or to obtain further copies of this Non-Technical Summary are provided at the end of this document.

2 Planning Policy Context

2.1. National Planning Policy

Airports National Policy Statement

2.1.1 The Airports National Policy Statement supports the sustainable growth of the UK's aviation industry; recognising the significant economic and social benefits this brings. It also sets out measures to ensure that adverse impacts are weighed against the positive impacts in determining whether to grant development consent.

2.1.2 The Airports National Policy Statement primarily relates to the proposed new runway at Heathrow Airport. However, it also confirms that the Government is supportive of airports beyond Heathrow making best use of their existing runways, subject to economic and environmental considerations.

Aviation Policy Framework

2.1.3 The Aviation Policy Framework was published in March 2013 and sets out Government aviation policy for airports within London and the south east of England.

2.1.4 The Aviation Policy Framework recognises that the aviation sector contributes significantly to the UK economy. However, it also notes that airports in the south east of England (including Heathrow and Gatwick) face capacity challenges. The Aviation Policy Framework identifies a number of other challenges in the aviation sector, noting that aviation needs to grow, delivering benefits essential to economic wellbeing, while respecting the environment and protecting quality of life.

2.1.5 The Aviation Policy Framework states that a key priority in the short term is to make the best use of existing capacity at all UK airports to improve performance, resilience and passenger experience.

Beyond the Horizon – The Future of UK Aviation: Making Best Use of Existing Runways

2.1.6 In June 2018, the Government reaffirmed its policy on making best use of existing runways, as part of the overall aviation strategy (HM Government, 2018). This confirmed Government support for airports beyond Heathrow making best use of their existing runways and recommended that any proposals should be judged taking careful account of relevant considerations, particularly economic and environmental impacts and proposed mitigations.

National Policy Statement for National Networks

2.1.7 The Project includes works (such as proposed improvements to the North Terminal and South Terminal roundabouts) that constitute Nationally Significant Infrastructure Projects in their own right. Therefore, the National Policy Statement for National Networks contains policy relevant to the highways elements of the Project[1].

National Planning Policy Framework

2.1.8 The EIA process has had regard to the National Planning Policy Framework, which is read alongside the National Planning Practice Guidance online resource where appropriate.

2.1.9 The policies contained within the National Planning Policy Framework articulate the Government's vision of sustainable development, which should be interpreted and applied locally to meet local aspirations. The framework also identifies a presumption in favour of sustainable development which has three dimensions: an economic role, a social role and an environmental role. These should not be seen in isolation, as economic growth can, for example, contribute to higher environmental standards.

2.2. Local Policy

2.2.1 The EIA process has taken into account existing and emerging local planning policy from the following local authorities:

- West Sussex County Council;
- Surrey County Council;
- Crawley Borough Council;
- Reigate and Banstead Borough Council;
- Tandridge District Council;
- Mid Sussex District Council;
- Horsham District Council; and
- Mole Valley District Council.

2.2.2 In addition, relevant supplementary planning documents are also considered. In some cases where the study area for a technical topic extends beyond the boundary of the administrative areas listed above, the planning documents relevant to additional administrative areas have also informed the assessment.

[1] it is noted that the Transport Decarbonisation Plan published by Department for Transport (DfT) on 14 July 2021 announced DfT's intention to review the NPS for National Networks in due course once demand patterns post-pandemic become clearer. It is understood DfT intends to commence the review by the end of 2021 and complete it by Spring 2023. In the interim and whilst the review is undertaken, DfT has confirmed the NPS for National Networks remains relevant government policy and has full force and effect for the purposes of the Planning Act 2008.

3 Need and Alternatives

3.1. Need

The Covid-19 Pandemic

3.1.1 The Covid-19 pandemic had a devastating impact on the global aviation industry in 2020. Gatwick, along with all other UK airports, experienced a significant reduction in passenger traffic levels as a result of both Government imposed restrictions on air travel and reduced passenger demand, driven by low consumer confidence. UK passenger volumes in 2020 were 78% down on volumes for 2019. It is expected that Government travel restrictions will continue to have an impact on passenger demand and traffic levels throughout 2021, but that by the end of 2021 traffic levels will start to recover.

3.1.2 While the immediate outlook therefore remains challenging, there is confidence across the aviation industry that passenger and airline demand at Gatwick Airport will return to previous levels over the course of the next few years and then continue to grow thereafter.

3.1.3 Overall, updated forecasts predict that it will take approximately four to five years for passenger traffic at Gatwick Airport to return to levels seen in 2019 and that, by the end of the 2020s, passenger levels at Gatwick Airport will have returned broadly to where they would have been had the pandemic not occurred. This reflects the inherent strength of demand for air travel generally, but particularly at Gatwick Airport, and the constraints on airport capacity in London and the south-east.

UK Aviation Demand

3.1.4 The UK airports handled a record 300 million passengers in 2019, of which the London airports accounted for 181 million or 60% of the total activity. Demand in the London system has been subject to strong growth, with over 34 million passengers added in the five-year period to 2019.

3.1.5 The latest demand forecasts from the Department for Transport predicted continued growth in demand of around 1.7% per annum in the long term (to 2050). This period was forecast to see demand increase by an additional 230 million passengers across the UK's airports. Recent short-term performance pre-Covid-19 has already outperformed the Department for Transport's projections.

3.1.6 It is widely recognised that airports in London and the South East of England are increasingly facing longer term capacity issues and, even with a third runway at Heathrow being considered, the Department for Transport forecasts show that demand will outstrip capacity in the London airports system by the mid-2030s.

3.1.7 The forecasts observe that Heathrow and Gatwick are already 'full', whilst Luton is operating close to its planning limit. By 2030, an additional 50 million+ passengers are forecast in the London market - far in excess of today's available capacity, indicating significant need for capacity development.

The Need for Capacity at Gatwick Airport

3.1.8 Gatwick Airport is a key piece of national infrastructure, an economic engine for local and regional growth, and the airport of choice for millions of passengers; serving an extensive catchment with a growing population. In 2019, it was ranked 12th in the world for the number of long-haul destinations served. Gatwick contributed £5.3 billion to the UK economy (pre-pandemic) and has supported over 85,000 jobs.

3.1.9 In 2019 Gatwick Airport handled some 285,000 aircraft movements, serving over 46.6 million passengers travelling to 228 destinations with 53 different airlines. Until 2017, Gatwick had the world's busiest single runway (55 aircraft movements per hour), and still has the world's busiest single runway operation during the day.

3.1.10 Whilst the forecasts suggest that some incremental growth is possible in response to intense demand, in practical operational terms, by normal standards, Gatwick as a single runway airport is 'full'.

3.1.11 A key benefit of the Project is enhanced operational resilience, particularly the ability for the airport to recover from unexpected events. The Project would:

- reduce the intensity of main runway operations;
- maintain continuity of operations, even if one runway is temporarily out of use, avoiding the current loss of time in switching to the standby runway;
- improve capacity at the busiest times by removing smaller aircraft departures from the main runway;
- reduce taxi times and airborne holding times; and
- reduce the risk of delay and time overruns to the benefit of passengers, airlines and the local community.

3.1.12 The Project would also enable the release of additional slots to meet pent up demand. This would drive connectivity, offer passengers a wider choice of destinations and create competition with consequential benefits to air fares.

3.1.13 Government policy has been consistently supportive over the last 20 years of making the best use of existing capacity at UK airports to improve performance, resilience and the passenger experience as a sustainable and balanced approach to meeting capacity demand. The Project is a direct and sustainable response to meeting known and future expected demand at Gatwick but also within the London and wider south east regions.

3.2. Alternatives Considered

3.2.1 To address increasing demand, the 2018 Draft Masterplan and the Final 2019 Gatwick Airport Master Plan considered the following scenarios.

- Scenario 1: where Gatwick remains a single-runway operation using the existing main runway. This scenario would use technology to increase the capacity of the main runway, leading to incremental growth through more efficient operations.
- Scenario 2: where the existing northern runway is routinely used together with the main runway.
- Scenario 3: where GAL continues to safeguard for an additional runway to the south.

3.2.2 The do minimum option (Scenario 1) would restrict future growth and Gatwick's ability to contribute to meeting future demand for increased aviation capacity. This option would not allow Gatwick to maintain best use of its existing runways as only one runway would be operational at any time.

3.2.3 GAL is not actively pursuing Scenario 3 in light of the Government's support for the third runway at Heathrow, but considers it in the national interest for land to continue to be safeguarded to allow for a new runway to be constructed to the south of the airport, if it is required in the future.

3.2.4 GAL is pursuing Scenario 2 and, therefore, the current assessment work relates to Scenario 2, given that it results in the following benefits.

- Aligns with Government policy of making best use of existing runways at all UK airports.
- In comparison to the existing situation and Scenario 1, provides greater UK point-to-point airport capacity to assist in delivering unmet Department for Transport forecasted aviation demand to 2050, whilst complementing the UK hub capacity provided by the expansion of Heathrow with a third runway.
- An increase in flights, improved connectivity, increased employment and economic benefits to the local area with a much reduced scale of environmental impact compared to that arising from an additional new runway (Scenario 3).
- Creates economic benefits to the national, regional, and London economies, including through supporting inward investment for business travellers and tourism.
- Provides additional operational resilience for the airport with the flexibility to routinely use two runways whilst minimising growth outside of the airport boundary.
- Does not prejudice the long-term safeguarding, in accordance with national policy, of the land to the south of the airport for a future additional runway.
- Delivers significant local economic benefits, including further employment and training opportunities for local people, supply chain opportunities for local businesses, increased local retail and leisure expenditure, and other economic stimuli to the local area.

3.2.5 Overall, it is considered that Scenario 2 offers a sustainable approach to providing greater operational resilience both at Gatwick Airport and improved UK airport capacity.

3.2.6 A review of design and layout options has been undertaken through an iterative design process for the Project. This review has taken into account operational, business case, deliverability, planning, surface access, environmental, community, land and property considerations. The current design of the Project is the result of the selection of design options against the identified considerations. It is considered that the selected Project design offers a sustainable approach to providing greater operational resilience both at Gatwick Airport and improved UK airport capacity. Further design work will continue throughout the EIA process and in response to consultation feedback to further refine the Project and to identify a preferred option where options currently remain.

4 Existing Site and Operations

4.1. Gatwick Airport

4.1.1 In 2019, Gatwick Airport served more destinations than any other UK airport and accommodated the following:

- total passengers: 46.6 million;
- commercial air traffic movements: 283,000; and
- total cargo: 150,000 tonnes.

4.1.2 Gatwick Airport currently operates from a single main runway and two passenger terminals: North Terminal and South Terminal. When the main runway is unavailable, the existing northern runway is used as a standby runway. The northern runway was used for 2,842 air traffic movements in 2019. The passenger terminals provide a variety of facilities including check-in desks, departure lounges, immigration and security. In addition, the airport provides hotels, office facilities and car parking. Key elements of the existing site are shown on Figure 3.

4.1.3 The network of taxiways allows aircraft to move around the airfield and access the existing piers where the passengers embark and disembark aircraft (Piers 1, 2 and 3 at South Terminal and Piers 4, 5 and 6 at North Terminal). Each pier has a number of aircraft stands, the number and configuration of which depend on the type and size of aircraft.

4.1.4 Furthermore, there are a number of airfield supporting facilities, including:

- airport fire station (airport fire service);
- central area recycling enclosure (CARE);
- motor transport, surface transport and ground maintenance facilities;
- cargo facilities;
- fire training ground;
- aircraft hangars;
- air traffic control tower;
- noise mitigation, including the existing bund and noise wall;
- internal access routes (including Larkins Road); and
- a fuel storage area (known as the fuel farm).

4.1.5 Surface water is managed through a series of existing drainage ponds. Rainfall runoff usually drains into these ponds and then flows into one of three watercourses: Crawter's Brook, Gatwick Stream and the River Mole, in accordance with existing discharge consents and necessary pollution control measures.

4.1.6 Foul water currently passes to the Crawley Sewage Treatment Works to the south east of the airport or Horley Sewage Treatment Works to the north east of the airport.

4.1.7 Gatwick Airport is directly connected to the M23 via the M23 spur road, approximately 25 miles south of central London. Gatwick Airport's railway station is located at the South Terminal. There is a direct transit link from the railway station to the North Terminal. The station provides over 120 direct rail connections, including direct trains to central London. These include the Gatwick

Express service to London Victoria as well as the Southern and Thameslink networks. The station served over 20 million rail journeys in 2019.

4.1.8 In 2019, approximately 24,000 staff worked at the airport, of which approximately 3,300 were employed directly by GAL. In 2020 with the prevailing pandemic conditions, the number of GAL staff fell to approximately 1,900 although this is expected to return to previous levels in line with recovering passenger numbers in the coming years.

4.2. Predicted Future Changes in Passenger and Cargo Throughput at Gatwick Airport

4.2.1 The COVID-19 pandemic had a very severe impact on the global aviation industry in 2020, with significant reductions in passenger traffic as a result of both Government-imposed restrictions on air travel and reduced passenger demand driven by low consumer confidence. It is expected that Government travel restrictions will continue to have an impact on passenger demand and traffic levels throughout 2021, but that by the end of 2021 traffic levels will start to recover.

4.2.2 Overall, updated forecasts predict that it will take approximately five years for passenger traffic at Gatwick Airport to return to levels seen in 2019 and that by the end of the 2020s, passenger levels at Gatwick Airport will have returned broadly to where they would have been had the pandemic not occurred. This reflects the combination of ongoing capacity constraints already experienced before and during 2019 and underlying market growth across the London system.

4.2.3 It is predicted that by 2038, passenger throughput would increase to approximately 62.4 million passengers per annum in the absence of the Project. These growth projections are based on a set of up-to-date air traffic forecasts that have been prepared by leading independent aviation specialists.

4.2.4 Three main factors influence the predicted change in future passenger numbers, as follows.

- Growth in runway utilisation in off-peak periods: whilst GAL is anticipating only minor changes in the number of daily aircraft movements during current peak summer months (July to September), during the off-peak periods – the shoulder months of summer (April to June and October) and in the winter months (November to March) – the number of daily aircraft movements is expected to increase by a greater amount than in the peak months.
- Up-gauging of aircraft fleets with larger aircraft: reflecting the trend for airlines to replace their fleets with larger aircraft having more seats.
- Increased load factors: an increase in the average occupancy levels of flights.

4.2.5 Cargo volumes are also forecast to increase from approximately 150,000 tonnes in 2019 to 254,000 tonnes in 2038.

4.3. Future Changes

4.3.1 A number of developments at the airport are proposed in the absence of the Project, including the following.

- A western extension to Pier 6 and an associated increase in aircraft stand numbers.
- Provision of new car parking including new multi-storey car parks 4 and 7 and introduction of robotics technology within existing long stay parking areas to increase capacity.

- Highway improvements, including local widening on the junction entry/exit lanes for both the North Terminal and South Terminal roundabouts, together with signalisation of the roundabouts and provision of enhanced signage.

4.3.2 In addition, a number of developments are proposed by others, including an extension to the existing BLOC hotel and reconfiguration of the Hilton hotel. Improvement works to Gatwick Airport railway station, which are currently under construction and would be operational prior to operation of the Project. Table 1 provides a summary of the key parameters.

Table 1: Existing Airport and Future Baseline - Summary of Key Parameters

Element	Key Parameter
Existing Gatwick Airport land ownership	747 hectares
Existing airport passenger throughput (2019)	46.6 million passengers per annum (mppa)
Predicted future baseline airport passenger throughput (2038)	62.4 mppa
Approximate existing commercial air traffic movements (2019)	283,000
Approximate existing non-commercial air traffic movements (2019)	2,000
Approximate existing total aircraft movements (2019)	285,000
Approximate future commercial air traffic movements (2038)	318,000
Approximate future non-commercial air traffic movements (2038)	2,000
Approximate future total aircraft movements (2038)	321,000
Utilisation of existing northern runway (number air traffic movements - 2019)	2,842
Existing cargo (2019)	150,000 tonnes
Predicted future cargo (2038)	254,000 tonnes
Existing number of piers	6
Number of piers (with Pier 6 extension)	6 (with extension to existing Pier 6)
Approximate existing 'on airport' short term and long term car parking	40,611 spaces
Approximate existing 'on airport' staff car parking	6,090 spaces
Approximate total existing 'on airport' parking	46,701 spaces
Predicted approximate future airport car parking (with future baseline car parking improvements)	53,451 spaces
Existing terminal floorspace: North Terminal	98,100 m^2
Existing terminal floorspace: South Terminal	119,300 m^2
Maximum height of existing terminal building: North Terminal	32 metres
Maximum height of existing terminal building: South Terminal	40 metres
Existing hotel rooms	3,000

Element	Key Parameter
Predicted future baseline hotel bed spaces (with future baseline projects)	3,250 (additional 250 beds)
Existing office floor space (in main office buildings)	34,590 m^2
Future baseline office floor space	34,590 m^2 (no change)

Airspace Management

Future Airspace Strategy Implementation (FASI) South

4.3.3 Airspace within the UK is regulated by the Civil Aviation Authority and managed by NATS En Route (NERL), which is a subdivision within the National Air Traffic Services (NATS).

4.3.4 Work is being undertaken to review the airspace over London and the south east of England, with the aim of addressing existing constraints and allowing for future growth in air transport. This work is being undertaken by NATS, in partnership with the Department for Transport and the Civil Aviation Authority and is known as the Future Airspace Strategy Implementation (FASI) South.

4.3.5 FASI South will be developed through an airspace change consultation in line with the Civil Aviation Authority airspace change process and will in due course be subject to its own assessment process. This process for the airspace around Gatwick Airport below 7,000 feet has just re-started (July 2021) but it will be some years before the outcome is clear. However, FASI South is not required in order to allow dual runway operations at Gatwick Airport. The EIA process for this Project has therefore been undertaken based on current flightpath information, updated to reflect the movement of the centreline of Gatwick Airport's northern runway by 12 metres.

4.3.6 Although the proposed FASI South airspace changes lie outside of the scope of this Project, should information on the outcome of the FASI South process become available during the course of the EIA process for the Project (at a time when the information can be taken into account prior to submission), the implications of this, in terms of amended noise impacts, will be reviewed and considered within the EIA process.

Airspace Change due to the Project

4.3.7 In order to ascertain whether an airspace change is required to enable dual runway operations at Gatwick Airport (with the realignment to the centreline of the northern runway), GAL has submitted a Statement of Need to the Civil Aviation Authority. This Statement of Need confirmed that the proposal would not alter traffic patterns. The Civil Aviation Authority has confirmed that GAL has met the requirements of the process and that all physical works associated with the Project would be considered through the Planning Act consenting process.

5 Project Description

5.1. Key Components of the Project

5.1.1 As set out in Section 1, the Project proposes alterations to the existing northern runway which, along with lifting the current restrictions on its use, would enable dual runway operations. Together with the alterations to the northern runway, the Project would include the development of a range of infrastructure and facilities to allow increased airport passenger and aircraft operations and to allow Gatwick Airport to make best use of its existing runways.

5.1.2 Key components of the Project include:

- amendments to the existing northern runway including repositioning its centreline 12 metres further north to enable dual runway operations;
- reconfiguration of taxiways;
- pier and stand alterations (including a proposed new pier);
- reconfiguration of other airfield facilities;
- extensions to the existing airport terminals (north and south);
- provision of additional hotel and office space;
- provision of reconfigured car parking, including new car parks;
- surface access (including highway) improvements;
- reconfiguration of existing utilities, including surface water, foul drainage and power; and
- landscape/ecological planting and environmental mitigation.

5.1.3 Figure 4 shows the key elements of the Project. The land within the Project site boundary comprises 820 hectares, of which 747 hectares lie within the ownership of GAL.

5.1.4 Once operational, the Project would result in all aircraft arrivals using the existing main runway and shared departures between the existing main runway and the altered northern runway. The existing taxiways would be amended and realigned to accommodate the altered northern runway and to allow safe manoeuvring of aircraft associated with both runways.

5.1.5 As a consequence of the Project, passenger throughput is anticipated to increase to approximately 75.6 million passengers per annum by 2038. This represents an increase in capacity of approximately 13.2 million passengers per annum compared to the compared to the forecast throughput of 62.4 million passengers per annum in the absence of the Project.

5.1.6 The Project would facilitate making better use of the existing runway to increase airfield capacity so that passengers can access the airport efficiently, with good levels of customer service, and would provide land for environmental effects to be mitigated.

5.1.7 A number of existing facilities would require reconfiguration, relocation or additional facilities to be provided. This would include the following:

- central airfield maintenance and recycling facilities;
- cargo facilities;
- fire training ground and satellite airport fire service provision;
- hangars;

- provision of perimeter boundary treatments to mitigate noise (eg noise walls and bunding); and
- internal access routes and forecourts.

5.1.8 Extensions to the existing North and South Terminals would be required to accommodate passenger growth. In addition, internal changes are proposed within the terminals such as reconfiguration works to facilities such as check in zones, baggage systems and security. The forecourts and approaches to both terminals would be enhanced. New hotels would be constructed at the North and South Terminals. Up to three new office blocks would also be provided to serve internal airport uses. New car parking would be required on site in order to meet additional parking demand generated by the proposed increase in passengers and to replace existing parking spaces that would be lost as a result of the Project.

5.1.9 In order to accommodate the proposed increase in passenger numbers, highway improvements are required at the locations where the increase in road traffic volumes is likely to be the greatest, including the South Terminal and North Terminal roundabouts and the Longbridge roundabout. The improvements include grade-separated junctions in each case. Options to increase the capacity of the Inter-Terminal Transit System between terminals are also being investigated.

5.1.10 Table 2 provides a summary of the key aspects of the Project that form the basis for the assessment of effects.

Table 2: Summary of Key Aspects of the Project

Element of the Project	Key Parameter for Assessment
Changes to Enable Dual Runway Operations	
Development consent application area	820 hectares
Works within existing GAL land ownership	747 hectares
Permanent land take (third party)	68 hectares
Temporary land take (third party)	6 hectares
Passenger throughput	
Future airport throughput (without Project 2038)	62.4 mppa
Project additional throughput (2038)	13.2 mppa
Proposed new airport throughput (with Project 2038)	75.6 mppa
Air traffic movements	
Approximate future commercial air traffic movements (2038 without Project)	318,000
Approximate future non-commercial air traffic movements (2038 without Project)	2,000
Approximate future total aircraft movements (2038 without Project)	321,000
Approximate additional commercial air traffic movements (2038 with Project)	64,000
Approximate future commercial air traffic movements (2038 with Project)	382,000

Element of the Project	Key Parameter for Assessment
Approximate future non-commercial air traffic movements (2038 with Project)	3,000
Approximate future total aircraft movements (2038 with Project)	385,000
Cargo throughput	
Future cargo throughput (2038 without Project)	254,000 tonnes
Project additional cargo (2038)	69,000 tonnes
Proposed cargo (with Project, 2038)	323,000 tonnes
Alterations to the Existing Northern Runway	
Centreline repositioning	12 meters to the north
Phasing	
Commencement of main construction phase	2024
Year of opening for northern runway	2029
Completion of construction works	2038

Flood Risk and Water Management

5.1.11 To accommodate the alterations to the northern runway, to allow for the areas of new development and to meet current planning requirements (including an allowance for climate change), modifications to floodplains of the River Mole and Gatwick Stream plus upgrades to the existing surface water drainage strategy are proposed. This would ensure that no adverse impact on flood risk is likely off site. Measures are anticipated to include the provision of additional floodplain capacity (called floodplain compensation areas), by lowering existing ground levels; works to realign existing surface water drainage infrastructure; creation of additional runoff treatment and flood compensation areas to complement the existing capacity.

5.1.12 Changes to the foul drainage system to improve capacity and resilience are proposed in order to provide for the new and improved facilities, including wastewater from the extended terminals, hotels and new pier. New pumping stations and pipeline connections to Crawley Sewage Treatment Works are proposed to accommodate flows from the extended North Terminal and the new pier.

Climate Change

5.1.13 In addition to GAL's existing net zero carbon commitments, as set out within their Decade of Change document, GAL is currently developing a detailed Carbon and Climate Change Action Plan, to enable the airport to continue to reduce carbon emissions and to deliver sustainable development. The following factors will be considered further:

- the scale of aircraft emissions will be reviewed to take into account the likely evolution and use of sustainable aviation fuels, and to reflect expected gradual transition to electric / hybrid aircraft in use on some domestic and short haul routes;
- more developed data on the design of buildings and infrastructure, and a more informed estimate of the material requirements and waste arisings from the construction of the Project;

- improved information from the strategic transport modelling to inform the assessments of surface access emissions;
- confirmation of the mitigation measures to be implemented and their effect on reducing the emissions arising from the Project including benefits of measures in the Carbon and Climate Change Action Plan currently under preparation; and
- any changes to UK carbon budgets resulting from the revision to the Climate Change Act.

5.1.14 The next steps will include close working with the Project design teams to confirm the adoption of mitigation measures through design of the airport facilities and highways infrastructure, optimisation of material sourcing and recycling of cut/fill materials, management of construction stage emissions, and the adoption of the energy strategy to reduce emissions arising from airport operations. The opportunities to mitigate impacts of the Project through both construction and operation will be collated into the draft Carbon and Climate Change Action Plan, to be published as part of the application for development consent.

5.2. Construction

5.2.1 The timing of the Project would be dependent on securing development consent and the discharge of the associated requirements. The indicative construction programme is based on construction commencing in 2024. The programme for the main airfield construction works would be of approximately five years duration enabling the altered northern runway and taxiways to be complete and fully operational in combination with the main runway in 2029. The indicative phasing is outlined in Table 3.

Table 3: Indicative Phasing

Anticipated Phasing	Component of the Project
2023	Pre-construction activities (including surveys for any unexploded ordnance and any necessary pre-construction surveys)
2024	Early works, including establishment of compounds, fencing, early clearance and diversion works and re-provision of essential replacement services
2024-2029	Reconfiguration of existing maintenance airfield facilities (Phase 1) Alterations to the existing northern runway Airfield works to support use of the realigned northern runway
2024-2030	Extensions to North and South Terminals
2024-2032	Hotel and commercial facilities
2024-2035	Car parking
2024-2038	Flood compensation areas
2029-2032	Surface access improvements including: ▪ South Terminal roundabout improvements (2029-2030) ▪ North Terminal roundabout improvements (2029-2032) ▪ Works to Longbridge roundabout (2030-2032)
2029-2034	Ongoing reconfiguration of existing maintenance airfield facilities (to final state) Further improvements to airfield facilities
2030-2034	Pier 7
2035	Reinstatement of final land use at temporary construction compound locations

5.2.2 Construction would be undertaken in accordance with a Code of Construction Practice. The Code of Construction Practice will set out the key management measures that contractors would be required to adopt and implement. These measures will be developed based on those identified during the EIA process. They include strategies and control measures for managing the potential environmental effects of construction and limiting disturbance from construction activities as far as reasonably practicable. An outline Code of Construction Practice is provided as part of the PEIR.

Control of Accidents and Disasters

5.2.3 The EIA Regulations require consideration of the effects on the environment resulting from the vulnerability of the Project to risks from major accidents and/or disasters, where these are relevant to the project concerned. Work has been undertaken to consider the design of the Project in relation to the potential for accidents and disasters to occur.

5.2.4 The Project would not introduce hazards during the construction phase which could not be effectively managed through the Code of Construction Practice and/or existing plans and procedures currently in place at the airport.

6 Approach to Environmental Assessment

6.1.1 This section of the Non-Technical Summary summarises the approach taken for the EIA process to date, to identify and evaluate the likely significant effects associated with the Project. EIA is intended to be an iterative process, which extends from project inception through to the final design and considers a project's impacts during its construction and operational stages.

6.2. Scope of the Assessment

6.2.1 Scoping is the process of identifying the issues to consider within the EIA process (ie establishing the scope of the assessment). A request for an EIA Scoping Opinion was made to the Planning Inspectorate in September 2019. This was supported by a Scoping Report, which set out the proposed technical scope, assumptions and methodology for the EIA process and its supporting studies. The Scoping Report was consulted upon widely by the Planning Inspectorate and responses were received from numerous stakeholders including statutory and non-statutory consultees, parish councils and members of the public.

6.2.2 Following consultation with the statutory bodies, the Planning Inspectorate (on behalf of the Secretary of State) provided a Scoping Opinion on 11 October 2019.

6.2.3 The scope of the EIA process underway for the Project, and the scope of the PEIR, has been informed by legislative requirements; the nature, size and location of the Project; the Scoping Opinion and consultation responses received to date.

Assessment Years

6.2.4 The approach to assessment has incorporated the use of identified assessment years to allow for preliminary evaluation of the likely effects during the phased construction process and during the operation of the Project. The following assessment years have been used to inform this PEIR:

- 2024 to 2029, representing the initial construction phase prior to opening of the altered northern runway;
- 2029: represents the opening year of the altered northern runway (and therefore the first point at which effects arising from its operation would occur);
- 2032: an interim assessment year;
- 2038: representing the year in which the development works proposed as part of the Project would be completed; and
- 2047: to meet a specific requirement of guidance in the Design Manual for Roads and Bridges to assess impacts 15 years after the last of the key highways works associated with the Project are due to be completed.

6.2.5 For the purposes of this PEIR, assessment concentrates on the period 2029 to 2038, with modelling topics modelling 2029, 2032 and 2038 as the primary assessment years. In addition, for some topics it is a requirement to assess the effects of the highways improvements 15 years after completion. Therefore, for these topics, an assessment is provided for 2047. Although the throughput at the airport is predicted to grow slightly between 2038 and 2047, no greater effects for other topics are predicted in this assessment year (due to factors such as improvements in aircraft performance over time).

Cumulative Effects

6.2.6 Cumulative effects with other proposed developments have been assessed as part of the EIA process. This includes consideration of whether the Project, when considered together with other proposed developments, may result in any greater effects on a receptor than the effects of the Project alone.

Heathrow Third Runway

6.2.7 There is still significant uncertainty surrounding when, or indeed if, a third runway will be developed at Heathrow. However, as a third runway at Heathrow remains Government policy, it is considered within the PEIR as a cumulative development (where appropriate), in line with other proposed developments, based on the information available at this time. However, information regarding the timing of the Heathrow works coming forward is limited at this time. As GAL progresses its work and prepares its final documents, including the formal Environmental Statement in support of an application for development consent, the status and information available regarding Heathrow's third runway will be considered and taking this into account, the assessment of cumulative effects will be kept under review.

6.3. Significance of Effects

6.3.1 Environmental Impact Assessment is a means of identifying and collating information to inform an assessment of the likely significant environmental effects of a development. For each of the key environmental topics, the following have been described:

- methodology/approach to assessment;
- description of the existing environmental (baseline) conditions and potential future baseline conditions (in the absence of the Project);
- identification and assessment of the significance of likely effects arising from the Project;
- identification of any mitigation measures proposed to avoid, reduce and, if possible, remedy adverse effects; and
- assessment of any cumulative effects with other proposed developments planned in the area.

6.3.2 In terms of significance, effects are described using the following scale:

- substantial;
- major;
- moderate;
- minor; and
- negligible.

7 Summary of Environmental Effects

7.1. Historic Environment

Introduction

7.1.1 Chapter 7: Historic Environment of the PEIR considers the potential effects of the Project on heritage assets including historic buildings and areas, historic landscape character and buried archaeological remains. Such effects could result from a direct physical impact leading to a loss of, or damage to, the heritage asset or harm to the significance of the asset resulting from change within its setting.

Assessment Methodology

7.1.2 Information about existing heritage assets has been acquired from a number of sources, including the Historic Environment Records for West Sussex and Surrey. Contact has also been made with organisations involved in previous archaeological investigations wherever possible, where data are not yet available from Historic Environment Records. Other data sources and baseline surveys have included: the National Heritage List for England; examination of historic maps; LiDAR assessment; aerial photograph assessment; and a detailed walkover survey.

Current Baseline Environment

7.1.3 The land within the Project site is predominantly occupied by the operational airport, within which very little remains of the preceding historic landscape. However, there are three designated heritage assets wholly within the Project site boundary (see Figure 5). These comprise the Grade II* listed Charlwood Park Farmhouse in the north western part of the Project site, along with Edgeworth House and Wing House, both listed at Grade II, in the eastern part of the Project site.

7.1.4 Charlwood Park Farmhouse is located just outside the current airport perimeter fence and is a timber-framed house of 15th century date, with later additions and amendments. In the 19th century it was the home farm for the Charlwood Park estate; the main house and the park were located further to the east and have been lost to the expanding airport. Wing House and Edgeworth House are separately listed at Grade II but are conjoined and are located in an area of car parking and modern buildings associated with the operational use of the airport, including the adjacent Marriott Hotel of which the historic buildings now form a part. Edgeworth House may be slightly earlier in date (15th or early 16th century), with Wing House being mid-16th century.

7.1.5 One Conservation Area lies partially within the Project site. This is the Church Road Conservation Area on the south western edge of Horley. The eastern part of the Conservation Area comprises a number of historic buildings including the Grade I listed Church of St Bartholomew and the adjacent Grade II listed Ye Olde Six Bells public house.

7.1.6 Within 1 km of the Project site boundary there is a considerable number of designated heritage assets. These include two Scheduled Monuments: an area of former medieval settlement at Tinsley Green to the south east of the airport; and a medieval moated manor house site known as Thunderfield Castle to the north east.

Mitigation Measures

7.1.7 With respect to the construction phase of the Project, good practice measures regarding noise and dust would be adopted and implemented through the Code of Construction Practice. Mitigation against potential impacts to buried archaeological remains would principally comprise avoidance through design or protection by placing material over the archaeological remains such that the impact of construction activities does not extend as far as the remains. The placement of materials may be permanent or may be temporary, with the materials being removed following completion of the construction activities.

7.1.8 A programme of further investigation of the archaeological potential of land within the Project site boundary is planned to take place ahead of the production of the Environmental Statement. The scope of these investigations will be agreed with the archaeological advisors to the relevant planning authority. The results of these investigations would be examined, and any opportunities for mitigation through avoidance or reduction of impact on buried archaeological remains would be identified and considered alongside other factors influencing the design process.

Potential Significant Effects

2024-2029

7.1.9 The majority of effects arising during the initial construction phase (2024-2029) would not be significant. Where proposed construction compounds/activities are located on previously developed land (ie the main contractor compound and the eastern part of the airfield satellite compound), archaeological remains are likely to have already been lost or badly damaged by earlier development, thereby limiting the potential for effects to arise.

7.1.10 In the proposed compound locations that are not previously developed, there is the potential for palaeochannels or buried archaeological remains to exist. A programme of archaeological investigation is planned to confirm the date, nature and extent of any archaeological remains, and the results will be reported in the Environmental Statement. The impact on buried archaeological remains as a result of the establishment of contractor compounds on land that has not been previously developed could result in a significance of effect up to major adverse. Appropriate mitigation measures would be incorporated to avoid or reduce damage to the buried archaeological remains. With these measures in place, the significance of effect would reduce to negligible to minor adverse. Where it is not possible to apply any mitigation measures, the effects would be offset by a programme of further archaeological investigation.

7.1.11 Some of the proposed flood compensation areas would involve the lowering of the ground levels. The significance of the effect on buried archaeological remains at Museum Field and land to the east would be up to major adverse and minor adverse (respectively), while an up to major adverse effect is predicted with regard to potential palaeochannels at Car Park X. The effect would be offset by a programme of further archaeological investigation.

7.1.12 The placement of spoil and subsequent construction of the decked car park at Pentagon Field could lead to impacts on buried archaeological remains resulting in a significance of effect up to major adverse. This effect would be offset through a programme of further archaeological investigation.

7.1.13 Environmental mitigation is proposed at parcels of land surrounding Museum Field where planting of trees and hedgerows would be undertaken. Where possible, a programme of archaeological

investigation is planned to confirm the date, nature and extent of any archaeological remains, and the results would be reported in the Environmental Statement. The impact on buried archaeological remains as a result of the environmental mitigation could result in a significance of effect up to major adverse. Appropriate mitigation measures would be incorporated into the establishment of the environmental mitigation land surrounding Museum Field to avoid or reduce damage to the buried archaeological remains. With these measures in place, the significance of effect would be negligible to minor adverse. Where it is not possible to apply any mitigation measures, the effects would be offset by a programme of further archaeological investigation.

7.1.14 There may also be up to moderate adverse effects resulting from impacts on potential buried archaeological remains as a result of the construction of the replacement 'Purple Parking' at the western end of Crawter's Field. These effects would be offset by a programme of archaeological investigation.

7.1.15 The relocation of Pond A and the diversion of the River Mole could impact on possible palaeochannels leading to an effect of up to moderate adverse significance. This effect would be offset by a programme of geoarchaeological investigation.

7.1.16 Effects on buried archaeology in other parts of the Project site would not be significant. No significant effects on the setting of heritage assets are likely.

2030-2032

7.1.17 During the period 2030-2032, there could be a major adverse effect on buried archaeological remains as a result of the establishment of the contractor compound at the Longbridge Roundabout. Appropriate mitigation measures would be incorporated into the construction works here to avoid or reduce damage to the buried archaeological remains. With these measures in place, the significance of effect would be minor adverse. Where it is not possible to apply any mitigation measures, the effects would be offset by a programme of further archaeological investigation.

7.1.18 Effects on buried archaeology in other parts of the Project site would not be significant. No significant effects on the setting of heritage assets are likely.

2033-2038

7.1.19 Later in the construction period (2033-2038), the construction of the flood storage area east of Gatwick Stream would lead to the complete loss or substantial damage of buried archaeological remains resulting from the reduction of ground levels. This would result in up to a major adverse effect which would be offset through a programme of further archaeological investigation.

7.1.20 Effects on buried archaeology in other parts of the Project site would not be significant. No significant effects on the setting of heritage assets are likely.

2038 – Operational Effects

7.1.21 No significant effects on the historic environment would arise following completion of the construction works.

7.1.22 No significant cumulative effects on the historic environment have been identified in the assessment based on the information available to date.

7.2. Landscape, Townscape and Visual Resources

Introduction

7.2.1 Chapter 8: Landscape, Townscape and Visual Resources of the PEIR describes and assesses the existing landscape and townscape character and views of the Project site and study area. This includes the character and features of the landscape and townscape and the changes as a result of the Project during construction and operation, during the daytime and at night. In addition, it considers the potential visual effects as a result of the Project.

Assessment Methodology

7.2.2 As a matter of best practice, the assessment has been undertaken based on the relevant guidance on landscape and visual assessment within the Landscape Institute and Institute of Environmental Management and Assessment *'Guidelines for Landscape and Visual Impact Assessment'* 3rd Edition.

7.2.3 A Zone of Theoretical Visibility of the Project has been generated to establish the 5 km radius study area to ensure that all receptors that may experience significant effects are included. Baseline analysis work has been undertaken to identify the existing townscape character of the site, the adjacent townscape of Horley and the landscape of Surrey and West Sussex and their condition, value and sensitivity to change. The assessment has made reference to published landscape and townscape assessments.

7.2.4 A separate, larger study area has been established to coincide with overflying aircraft at height profiles up to 7,000 feet above ground level to address effects on landscape tranquillity and visual receptors within nationally designated landscapes including the High Weald, Surrey Hills and Kent Downs Areas of Outstanding Natural Beauty and the South Downs National Park.

7.2.5 Baseline field work, including site surveys, has been undertaken to confirm the people that are likely to have views of the Project. Representative viewpoints have been used to assess the potential visual impacts of the Project on the different range of views within or towards the Project site. Further viewpoints will be identified and added to the assessment process, as required in consultation with local authorities and Natural England.

Current Baseline Environment

Landscape and Townscape Character

7.2.6 Due to the scale and nature of development at Gatwick Airport, the airport forms its own distinctive and well-defined urban townscape within the wider Low Weald landscape that is not separately defined in published character assessments (see Figure 6). Gatwick Airport occupies the majority of land within the Project site boundary with smaller areas of farmland and open space beyond the current airport boundary. The majority of the land within the site is flat and open. The main built form is located at the North Terminal and South Terminal clusters. Rural landscapes of the Open Weald lie to the north, the Upper Mole Farmlands to the west and south, the High Woodland Fringes to the east and the Low Weald around Horley to the north east. Four areas of ancient woodland are located within the Project site, including Horleyland Wood and Brockley Wood. There are no designated landscapes that lie within the Project site. The High Weald Area of Outstanding Natural Beauty lies approximately 3 km to the south east.

Views

7.2.7 The site is currently not visible in views from most parts of Crawley and Horley due to intervening vegetation or development. Views from the surrounding rural landscapes are generally screened by intervening vegetation. Key people likely to have views of the Project include:

- walkers and equestrians using public rights of way within and around the airport;
- cyclists using cycle routes including National Cycle Route 21;
- occupiers of residential properties at Horley;
- occupiers of commercial properties around the airport edge;
- occupiers of vehicles using the A23 and occupiers of trains;
- visitors to Gatwick Airport using roads, car parks, hotels and terminals; and
- members of staff working at Gatwick Airport.

Mitigation Measures

7.2.8 A number of measures have been designed into the Project to reduce the potential for impacts on landscape, townscape and views including:

- retention of and protection of existing vegetation;
- proposed planting;
- proposed new areas of open space;
- lighting strategy;
- proposed earthworks/earth shaping; and
- proposed visual screens.

Potential Significant Effects

Landscape and Townscape Character

7.2.9 Due to the largely urban character of the airport within the Project site, its redevelopment would result in the removal of a limited number of important landscape or townscape features. New buildings and infrastructure would form an intensification of the existing character of the airport and neighbouring settlements of Crawley and Horley. Development of currently undeveloped land within the airport would have a greater impact on the character of more sensitive areas.

7.2.10 In terms of landscape effects, major adverse and significant effects on Pentagon Field are predicted during all phases of the Project (due to the development of Pentagon Field and change in character from pastureland to decked car park). These effects would be very limited in extent (arising as a result of the change in the landscape character of the field itself). The effects on the wider Gatwick Airport Urban Character Area would not be significant.

7.2.11 Significant adverse effects on surrounding landscape character areas within the study area are unlikely as the airport context would remain largely similar and screening provided by existing vegetation, built development and earth mounds would remain or would be replaced as party of the Project.

7.2.12 In terms of cumulative effects, the Project has the potential to contribute to significant effects on the High Woodlands Fringes, Upper Mole Farmlands, Low Weald and Mole Valley Open Weald Character Areas. By 2033 and during 2038, the effect on the Low Weald Character Area would reduce such that it would not be significant, whilst the effect on the Mole Valley Open Weald and

High Woodlands Fringes Character Areas would reduce such that cumulative effects would not be significant, while the effect on the High Woodlands Fringes and Upper Mole Farmlands Character Areas would remain significant. However, the Project (specifically the decked car park at Pentagon Field and A23 improvements in this case), would, on balance, make a negligible contribution to this cumulative effect due to the comparatively large scale and extent of the other proposed cumulative developments.

Visual Amenity

7.2.13 There are likely to be very few people who would experience significant adverse effects as a result of the Project.

7.2.14 During construction, some temporary significant effects on views are possible. Major adverse and significant effects are predicted for walkers using the public right of way at Pentagon Field and pedestrians using Balcombe Road during the initial construction phase (2024-2029) and in the first period of operation (2030-2032) before mitigation planting has matured.

7.2.15 Occupiers of the Hilton Hotel would experience moderate to major adverse visual effects between 2030 to 2032 due to temporary construction effects.

7.2.16 No other effects on visual amenity would be significant. The operational elements of the Project and the construction activities described above would be visible to members of Gatwick staff working in different locations within the airport or using staff car parks and internal access roads. The activities and developments may be barely perceptible when seen at distance, or prominent and at times dominant when in close proximity. This would result in effects that would not be significant due to the established airport development. No significant permanent visual effects are predicted, once new vegetation has matured.

7.2.17 No significant cumulative visual effects on visual receptors previously identified in Chapter 8: Landscape, Townscape and Visual Resources are predicted based on the information available to date.

Tranquillity

7.2.18 It is anticipated that there would be up to a 20% increase in the number of overflying aircraft at less than 7,000 feet above ground level. This increase is most likely in areas currently overflown by the largest number of aircraft. This change may be discernible to some people or barely perceptible to others, due to the existing conditions. The change to the existing level of tranquillity within the nationally designated landscapes within the study area would not be significant.

7.3. Ecology and Nature Conservation

Introduction

7.3.1 Chapter 9: Ecology and Nature Conservation of the PEIR identifies and assesses the potential effects of the Project on the ecology and nature conservation interest of the Project site and surrounding receptors.

Assessment Methodology

7.3.2 Information on ecology and nature conservation was collected through a data gathering exercise to obtain information relating to statutory and non-statutory nature conservation sites, priority habitats and species, and legally protected and controlled species.

7.3.3 Records of protected or otherwise notable species have been requested from the local records centres within a 2 km radius of the Project site boundary, except for bats and otter where a larger 10 km radius has been used in accordance with relevant guidance.

7.3.4 A number of site-specific surveys were also undertaken to assess the Project site conditions. The following surveys were conducted:

- phase 1 habitat survey;
- hedgerow survey;
- badger survey;
- bat activity, emergence and trapping surveys;
- breeding bird survey;
- wintering bird survey;
- dormouse survey;
- great crested newt survey;
- reptile survey;
- water vole and otter survey;
- national vegetation classification survey;
- fish survey;
- invertebrate habitat appraisal;
- terrestrial invertebrate survey; and
- aquatic invertebrate survey.

Current Baseline Environment

7.3.5 There are 17 statutory designated sites located within the search area. These include three internationally designated sites which are situated within 20 km and 14 nationally designated sites within 5 km of the Project site boundary (see Figure 7).

7.3.6 There are no statutory designated sites within the Project site boundary with the nearest being Willoughby Fields Local Nature Reserve, which is located approximately 786 metres to the south of the Project site.

7.3.7 A total of 21 non-statutory designated sites were identified within 5 km of the Project site boundary through the desk study.

7.3.8 The Project site was found to largely comprise low value habitats associated with the airport and infrastructure, comprising large areas of hardstanding and amenity grassland with areas of ornamental shrub and tree planting. These areas are predominantly located within the centre of the Project site. Areas around the periphery of the airport were identified as more natural and included areas of broadleaved woodland and neutral grasslands.

7.3.9 In terms of species, the baseline study and surveys identified 61 species of wintering bird and 72 species of breeding bird within the survey boundary, 48 of which were confirmed to be breeding and three potentially breeding. Grass snakes were recorded within the Project site in two distinct

areas, along the River Mole corridor and within the land east of the London to Brighton railway. Great crested newts, smooth newts, common toad and common frogs were also recorded in ponds across the Project site.

7.3.10 The desk study search provided records for at least 14 bat species within and immediately adjacent to the Project site and at least six bat species were recorded across the survey area, including rare species. Two buildings within the Project site were identified as having suitable features present to support roosting bats. However, no bats were recorded emerging from either building, and bat activity was generally very low during the emergence surveys.

7.3.11 Signs of badger activity were recorded during badger surveys. Due to the sensitive nature of badger data, the full findings of the surveys are reported in a confidential report, which is available upon request to those with a legitimate need for the information.

7.3.12 No signs of dormice, otters or water voles were recorded within the Project site boundary.

7.3.13 An invertebrate habitat appraisal identified features of moderate invertebrate interest within the land south of the Aviation Museum and west of the Fire Training Ground, Museum Field and Pentagon Field. The River Mole and Gatwick Stream also supported macroinvertebrate communities and both watercourses had consistently high fish populations.

Mitigation Measures

7.3.14 A number of measures have been designed into the Project to reduce the potential for impacts on ecology and nature conservation. These measures include:

- avoidance of development at designated sites, areas of woodland (including ancient woodland) and other sensitive habitats wherever practicable;
- protection of retained woodland, trees, scrub and hedgerows;
- measures for the appropriate storage of material and fuels and the management of runoff to avoid the pollution of designated sites;
- suitable timing of required vegetation clearance to reduce impacts to breeding birds;
- translocation of reptiles and amphibians;
- creation of artificial badger setts;
- measures to ensure that no badgers are harmed during the construction phase;
- lighting designed to avoid disturbance to areas of value for bats;
- creation of new, high value habitats comprising woodland, tree, shrub and scrub planting, grassland and wetlands/ponds;
- restoration of temporary land take to habitats of existing or greater ecological value;
- provision of bat roost features;
- replacement of non-native hedgerow with native species-rich hedgerow;
- tree and scrub planting to reinforce habitat connectivity;
- creation of a new high value pond in the Gatwick Stream flood compensation area;
- realignment of the River Mole to provide a more natural river profile; and
- creation of new habitats for great crested newts, grass snake, aquatic and terrestrial invertebrates.

7.3.15 The Project would include monitoring to determine the success of the mitigation measures implemented and to identify any required remedial measures. Monitoring would be undertaken for great crested newts, grass snakes, bats and badgers.

Potential Significant Effects

7.3.16 An assessment of the effects found that the Project would have no effect on statutory or non-statutory designated sites or areas of ancient woodland. The effects on habitats and species are generally found to be not significant. The potentially significant effects are described below.

7.3.17 In terms of effects on habitats, the initial construction phase of the Project (2024-2029) and the following period (2030-2032) would require the removal of species-poor hedgerow and loss of plantation woodland and scrub habitat. The loss of these habitats would result in moderate adverse and significant effects that would not be mitigated for until the end of the construction phase. Additional hedgerow planting would be undertaken early in the construction phase on other parts of the Project site, which would enhance habitat connectivity in these areas. This would result in a moderate beneficial and significant effect in the longer term.

7.3.18 The Project would require the removal of habitats in the initial construction phase which would result in the temporary displacement of breeding birds. The loss of suitable breeding sites would result in a moderate adverse and significant effect during the initial construction phase (2024-2029). The habitat loss would also result in a temporary moderate adverse effect on the bat and invertebrate assemblages. This would be a temporary effect until new tree, grassland and shrub planting had established.

7.3.19 No permanent significant effects would arise as a result of the Project. Some negligible to minor beneficial permanent effects would arise as a result of habitat creation.

7.3.20 Based on the information available regarding other proposed developments at this stage, no potential for significant cumulative effects has been identified.

7.4. Geology and Ground Conditions

Introduction

7.4.1 Chapter 10: Geology and Ground Conditions of the PEIR assesses the effects on land and groundwater quality, land instability and mineral resources as a result of the Project. It includes an appraisal of baseline conditions informed through collation of data from a range of sources, including published data sources and previous ground investigation and assessment reports.

Assessment Methodology

7.4.2 The assessment includes an evaluation of ground conditions and the nature of any contamination present. Part of the assessment includes a review of existing ground investigation data pertaining to the Project site from which a generic quantitative risk assessment has been carried out in accordance with current guidance and best practice. Chemical analytical data have been compared to published assessment criteria and exceedances identified.

7.4.3 The study area includes the Project site and an additional buffer of up to 500 metres. This is considered to be sufficient to enable the identification of off-site potential sources of contaminants of concern, other factors which may have influenced site conditions and/or sensitive off-site receptors that require consideration.

7.4.4 Baseline information on geology, hydrogeology and ground conditions was collected through a detailed desk review of existing studies and datasets.

7.4.5 A site walkover was also undertaken to validate the information collected from the desk review and to identify any existing sources of potential contamination.

Current Baseline Environment

7.4.6 The Project site is underlain by superficial deposits including Alluvium, Head and River Terrace Deposits. The deposits are associated with the surface watercourses that flow across the site and are classified as Secondary A aquifers and have a medium sensitivity. The underlying bedrock comprises Weald Clay, which is classified as an Unproductive stratum and has a low sensitivity.

7.4.7 The Project site is located within a Brick Clay Resource Mineral Safeguarding Area as designated by the West Sussex County Council Minerals Planning Authority.

7.4.8 A review of historic maps shows that the Project site had been developed as an aerodrome by the 1930s and major airport development had occurred by the 1950s. Prior to this, the site was used as farmland, a racecourse and golf course, with a railway line through the site. The airport has been subject to further development, which has been accompanied by an extensive drainage and balancing pond network and hotel, car parking and commercial development.

7.4.9 A number of previous investigations have been undertaken on the Project site, the review of which has focused on the areas of the site proposed for redevelopment. Elevated levels of contaminants were detected in soil, leachate and groundwater samples taken from various locations, together with elevated levels of ground gas.

7.4.10 A site walkover was undertaken in September 2019 in order to ground truth information from the desk study and to identify potentially contaminating land uses.

Mitigation Measures

7.4.11 The desk study and site walkover information was used to identify potentially contaminating land uses. This information was combined together to identify Potential Areas of Concern. A strategic approach has been used to target parts of the Project site where further investigation may be required based on the potential for contamination to exist and the future use of the area.

7.4.12 The approach to mitigation includes ground investigations, together with implementation of a remediation strategy where necessary. The Code of Construction Practice will include measures to prevent and control spillage of oil, chemicals and other potentially harmful liquids, in addition to measures to protect groundwater during construction.

7.4.13 A Materials Management Plan will be prepared to document the management of soils on the site, undertaken in accordance with best practice.

Potential Significant Effects

7.4.14 The assessment has considered potential impacts on the underlying aquifers, surface watercourses, human health (construction workers and future site users) and mineral resources. The significance of effect is predicted to range from temporary minor adverse effects during construction where remediation is required, to no change during the operational phase. No significant effects have been identified.

7.4.15 Given the measures in place, the Project is not anticipated to have any significant cumulative effects.

7.5. Water Environment

Introduction

7.5.1 Chapter 11: Water Environment of the PEIR assesses the effects of the Project, on all aspects of the water cycle including: flood risk, surface water drainage, geomorphology, water quality, groundwater resources, water supply and wastewater.

Assessment Methodology

7.5.2 A baseline assessment of all sources of flood risk and surface water drainage has been undertaken. The findings are reported in a Flood Risk Assessment in accordance with planning practice guidance and the National Planning Policy Framework. The Flood Risk Assessment considers flood risk to the Project site from all sources, including fluvial, surface water, groundwater, flooding from reservoirs and sewer/ water supply flooding. The assessment is primarily based on site-specific fluvial hydraulic modelling that has been developed by GAL, in partnership with the Environment Agency.

7.5.3 A geomorphological walkover survey of the site study area was undertaken to develop an understanding of channel characteristics on the watercourses which are potentially impacted by the Project.

Current Baseline Environment

7.5.4 Gatwick Airport is located in the Thames River Basin District and within the Upper Mole catchment. The River Mole flows through the airport, passing under the existing main and northern runways in culvert. Tributaries of the River Mole, including Crawter's Brook, the Gatwick Stream and Westfield Stream all run through or adjacent to the Project site.

7.5.5 There are areas classified as being within Flood Zone 3 (areas at risk of flooding in a 1% (1 in 100 annual probability) and Flood Zone 2 (area at risk of flooding in between a 1% and 0.1% (1 in 100 to 1 in 1000 annual probability) within the Project site. These are associated with the River Mole, Westfield Stream, Man's Brook and Crawter's Brook on the western and southern sides of the airport and with the Gatwick Stream on the eastern side.

7.5.6 According to the Environment Agency's Risk of Flooding from Surface Water mapping, surface water flooding occurs in several areas of the airport. Areas at high risk (greater that 3.3% (1 in 30 annual probability) are predominately associated with areas around existing watercourses or drainage features, although there are isolated pockets of high risk likely to be the result of rainfall filling local depressions rather than overland flow paths. Areas at medium risk (between 3.33% and 1% (1 in 30 and 1 in 100 annual probability) are generally small and adjacent to the areas at high risk. A large area at medium risk is located near the River Mole and south of the existing main runway. There are larger areas predicted to be at low risk (between 1% and 0.1% (1 in 100 and 1 in 1000 annual probability) within the airport, particularly to the south of the main runway and in proximity to existing terminal buildings.

7.5.7 British Geological Survey mapping identifies that there is susceptibility to groundwater flooding throughout areas of the Project site underlain by superficial deposits (ie superficial deposits

flooding), with a moderate level of confidence. Based on the Crawley Brough Council Strategic Flood Risk Assessment there have been only two occurrences of groundwater flooding recorded in the Crawley area. These are not located near the airport.

7.5.8 In terms of water quality, the River Mole upstream of Horley is classed as 'Heavily Modified' with a current potential status of 'Good'; and overall objective of 'Good', as defined by the Water Environment Regulations.

Mitigation Measures

7.5.9 A number of measures have been designed into the Project to reduce the potential for impacts on the water environment. Mitigation measures would include the following:

- provision of floodplain compensation areas;
- relocation and reconfiguration of the existing Pond A surface water attenuation facility;
- diversion of the River Mole;
- new culvert design;
- provision for new syphons to connect the floodplain on both sides of taxiways;
- provision of a drainage strategy for the proposed highway improvements;
- pollution monitoring system installation at ponds; and
- wastewater system capacity upgrades.

7.5.10 Gatwick would continue to monitor the quality of water discharges to ensure compliance with environmental permits post-consent.

Potential Significant Effects

7.5.11 Overall, the significance of flood risk effects from the Project on all sources of flood risk has been assessed to be (at worst) negligible or minor adverse and therefore not significant in terms of EIA regulations, taking into account the proposed mitigation measures. The Project would therefore be safe for its users and would not increase flood risk elsewhere. For certain receptors, the Project would result in an improvement in terms of flood risk, which would be a significant beneficial effect in some cases.

7.5.12 There would be very limited adverse effects throughout all phases of the Project. The Project would require modifications to the alignment of the River Mole, including the re-meandering and restoration of the natural channel morphology, and improved channel diversity and floodplain coupling. In the long term this would deliver an overall improvement to the geomorphology of the watercourses resulting in an overall beneficial effect for this watercourse.

7.5.13 No significant cumulative effects on the water environment have been identified in the assessment.

7.6. Traffic and Transport

Introduction

7.6.1 Chapter 12: Traffic and Transport of the PEIR identifies and assesses the potential environmental effects on traffic and transport arising from the Project.

Assessment Methodology

7.6.2 The traffic and transport environmental effects on severance, driver delay, driver stress, view from the road, pedestrian and cyclist delay and amenity, accidents and safety, hazardous loads, and public transport services and users have been assessed.

7.6.3 The assessment of the environmental effects of traffic and transport has been based on the relevant guidance from the Institute of Environmental Assessment.

7.6.4 Strategic modelling work has informed the assessment undertaken to date. The modelling work has been undertaken in consultation with Highways England and the relevant highway authorities.

7.6.5 Desk studies have been undertaken to inform the baseline conditions and update GAL's modelling tools to assess the likely effects of the Project.

7.6.6 A number of site-specific surveys of the Project site were also undertaken to inform the assessment including traffic counts, employee surveys, journey time data and airport-related cargo and goods movement data.

7.6.7 For the purposes of this assessment, the receptors are considered to be pedestrians, cyclists, bus and coach passengers, rail passengers, and car drivers and passengers.

Current Baseline Environment

7.6.8 Gatwick Airport can be directly accessed from the national strategic road network via the M23 motorway, which runs north-south adjacent to the airport. Junction 9 of the M23 is the main access point, with an onward link of dual carriageway motorway (M23 Spur) to Junction 9a at the South Terminal roundabout.

7.6.9 The A23, which runs parallel to the M23, continues north beyond the M25 into London via Croydon and Brixton to the West End and the City. It connects south London and Croydon, through Redhill then Horley and Gatwick Airport, through Crawley and providing a connection to the south through Pease Pottage to Brighton.

7.6.10 Transport facilities within the airport boundary are made up of on-airport roads, forecourts and car parks, including facilities for coaches, taxis and car rental companies. GAL has recently completed works to improve the North Terminal forecourt.

7.6.11 Gatwick Airport has a very high level of rail connectivity, with 22 trains to and from central London in the morning peak hour (12 via London Bridge and 10 to London Victoria, of which four are Gatwick Express services).

7.6.12 The airport is served by frequent bus and coach services at both North and South Terminals. The operators include Metrobus, National Express, Megabus, Oxford Bus Company, and easyBus. On average there are approximately 450 and 500 daily arrivals and departures respectively, offering services to destinations throughout the UK.

7.6.13 There are off-road pedestrian and cycle links available, which provide access to the local catchment areas of Horley and Crawley. National Cycle Route 21 provides a continuous route between Crawley, Gatwick, Horley, Reigate and London. Route 20 continues south towards

Brighton and Route 21 continues east towards Royal Tunbridge Wells before heading south towards Eastbourne.

Mitigation Measures

7.6.14 As part of the Project, measures have been incorporated to reduce the potential for significant effects on traffic and transport. This includes highway improvement works to the North and South Terminal roundabouts, which involve grade-separated (flyover) solutions. The Longbridge roundabout is proposed to be substantially improved, providing full-width running lanes throughout the junction, replacing the sub-standard narrow lanes that currently exist.

7.6.15 Other mitigation measures include Road Safety Audit and the implementation of a Construction Traffic Management Plan and Travel Plan.

7.6.16 Ongoing monitoring of travel patterns is expected to ensure the success of the Travel Plan and to implement measures to further encourage the use of sustainable modes of transport as part of the Airport Surface Access Strategy. Annual reporting will be undertaken to assess the performance against targets.

Potential Significant Effects

7.6.17 The assessment shows that, given the existing high traffic flows on the highway network, the Project is not expected to generate substantial traffic flows beyond the local highways. However, due to redistribution effects, the strategic modelling work shows that there could be some increases in traffic flows in areas such as Croydon during certain times of day (which are not as a result of the Project), particularly during the interim assessment year 2032.

7.6.18 Within the vicinity of the airport, there are segregated pedestrian and cycle routes which reduce the sensitivities of the highway links. The proposed highway works as part of the Project would improve pedestrian and cycle routes and reduce junction conflicts, which would improve safety and minimise the risk of accidents.

7.6.19 Construction of highway improvements is expected to take place after the main airport construction activities are complete. Construction would be undertaken with the aim of minimising disruption both to airport and local traffic.

7.6.20 Based on the methodology, assessment criteria and assignment of significance set out in this chapter, the majority of identified effects would not be significant. However, for a small number of road links, potentially significant effects on car drivers/passengers (in terms of driver delay) and, in one case, on pedestrians and cyclists (in terms of severance) have been identified. This will be considered further as the EIA process continues and it is anticipated that with further measures in place, long term effects would not be significant.

7.6.21 Cumulative traffic and transport effects are inherently included in the future baseline scenarios modelled within the assessment.

7.7. Air Quality

Introduction

7.7.1 Chapter 13: Air Quality of the PEIR evaluates the likely environmental effects of the Project on air quality from emissions from aircraft, road traffic and other emission sources.

Assessment Methodology

7.7.2 The existing air quality conditions were established using a variety of sources including monitoring undertaken by the consultant team and local authorities, background concentrations predicted by Defra and data provided by GAL on the operation of the airport.

7.7.3 Emissions from road traffic and airport activity have been calculated and input into an atmospheric dispersion model to calculate predicted concentrations of pollutants at sensitive receptors (both human and ecological). The resultant concentrations have been compared against air quality standards and predicted changes to assess the impact of the Project.

7.7.4 Site-specific monitoring of ambient concentrations of nitrogen dioxide using diffusion tubes with measurements taken on a monthly basis was undertaken to inform the assessment.

Current Baseline Conditions

7.7.5 Both Crawley Borough Council and Reigate and Banstead Borough Council have declared Air Quality Management Areas in their administrative areas due to exceedances of the annual mean nitrogen dioxide air quality standard.

7.7.6 The Horley Air Quality Management Area was declared by Reigate and Banstead Borough Council in 2002 and encompasses an area of the south west quadrant of Horley near the airport. The Hazelwick Air Quality Management Area was declared by Crawley Borough Council in 2015 and encompasses the Hazelwick roundabout and areas along the adjoining roads; the A2011 Crawley Avenue, Hazelwick Avenue, the A2004 Northgate Avenue and Gatwick Road. The Hazelwick AQMA is currently in the process of being extended to include the Three Bridges area, forming a single extended Crawley AQMA. This will add an additional area onto the south eastern ‘arm’ of the current AQMA. Consultation has ended and the extension recommendation has been approved.

7.7.7 Monitoring data for the continuous monitoring sites indicate that annual mean nitrogen dioxide concentrations over the five year period from 2015 to 2019 have consistently been below the air quality standard (ie no exceedances of the standard detected).

Mitigation Measures

7.7.8 Air quality mitigation measures are proposed to ensure best practice is followed for all on site activities during construction. Measures from best practice guidance would be implemented through the Code of Construction Practice. The measures would include the development and implementation of a Dust Management Plan with mitigation such as water spraying, covering of dusty materials and speed limits on site.

7.7.9 Low emission plant would be used during construction of the Project elements. GAL is committed to mobile construction equipment meeting zero or ultra-low emission standards by 2030.

7.7.10 There will be a Construction Traffic Management Plan to reduce construction traffic and minimise impacts on the highway network. Construction traffic routing will direct traffic through the M23 Junction 9 in order to avoid any routing through the M23 Junction 10 and Hazelwick AQMA. There will also be a Construction Workforce Travel Plan with measures encouraging more sustainable travel patterns.

7.7.11 Traffic during operation of the Project would be further mitigated through the Airport Surface Access Strategy and the Travel Plan for Gatwick Airport.

7.7.12 In relation to aircraft emissions on the airfield, the airport has provision for fixed electrical ground power on any new stands. In relation to other airport emissions, the airport is using airside electric vehicles. GAL is committed to all on-airport vehicles and ground support equipment meeting zero or ultra-low emission standards by 2030.

7.7.13 In terms of monitoring, GAL is currently carrying out continuous monitoring within the airport. It is anticipated that this monitoring will continue in the future.

Potential Significant Effects

7.7.14 With the implementation of appropriate mitigation, the effects of construction-related activities on dust soiling and human health are not anticipated to be significant. The mitigation measures are applicable throughout the construction works, which would continue beyond the initial construction phase in 2024-2029, through to 2038.

7.7.15 The results of the assessment model show that during all future year scenarios (2024, 2029 and 2032) and for the 2038 design year (aircraft emissions only), no significant effects for air quality are anticipated as a result of the Project. Predicted pollutant concentrations at all receptors in the two AQMAs would be below the air quality standard (ie no exceedances are predicted) and the Project would therefore not create exceedances of the air quality standard in these areas.

7.7.16 An ecological assessment of the change in nitrogen dioxide concentrations and change in nitrogen deposition as a result of the Project was undertaken for future year scenarios at sensitive ecological receptors. The change in nitrogen dioxide was assessed against the site's capacity to adapt to change. No significant effects are anticipated at the ecological receptors due to the Project.

7.7.17 No significant cumulative effects to air quality have been identified in the assessment.

7.8. Noise and Vibration

Introduction

7.8.1 Chapter 14: Noise and Vibration of the PEIR assesses the impact of the Project on the following types of noise:

- air noise – noise from aircraft in the air or departing or arriving (including reverse thrust) on a runway, generally assessed to a height of up to 7,000 feet above ground level;
- ground noise – noise generated from airport activities at ground level including aircraft taxiing and traffic within the airport boundary;
- road traffic noise – noise from traffic vehicles outside the airport on the public highway; and

- construction noise and vibration – noise and vibration from temporary construction of the Project, including the use of construction compounds.

Assessment Methodology

7.8.2 Baseline noise level measurements were conducted at a number of locations relevant to the Project. Measurements were conducted continuously over a two week period.

7.8.3 The approach to assessing noise effects from the Project has focused on firstly identifying significant adverse effects that may arise and identifying mitigation measures to avoid these, and secondly identifying adverse effects that may arise that may be below the threshold for significance and identifying mitigation measures to minimise these as far as practicable. Thirdly, opportunities to reduce noise levels from the baseline case and identify improvements to the noise environment have been explored.

Current Baseline Conditions

7.8.4 For ground noise, the current baseline noise levels have been assessed at twelve of the nearest noise sensitive receptors.

7.8.5 For air noise, modelling was carried out by the Civil Aviation Authority's Environmental Research and Consultancy Department. Day and night noise levels were predicted using a variety of noise metrics to estimate populations and noise sensitive buildings within defined noise contours.

Mitigation Measures

7.8.6 Construction would be undertaken in accordance with the Code of Construction Practice which will require contractors to adopt and implement appropriate management measures. These measures include strategies and control measures for managing the potential environmental effects of construction and limiting disturbance from construction activities as far as reasonably practicable. Where best practicable means to reduce noise on site are insufficient, noise insulation would be offered for qualifying buildings. Noise insulation or, where appropriate, temporary re-housing would avoid residents being significantly affected by levels of construction noise inside their dwellings.

7.8.7 The Project would not require a formal airspace change. This will avoid the noise impacts often associated with new flight paths. Only departures would use the northern runway, except during maintenance or emergency use as is currently the case. The majority of these would be above 1,000 feet before they leave the airfield.

7.8.8 It is proposed that the use of the northern runway would be limited to the period 06:00 hour to 23:00 hours, avoiding the majority of the more sensitive night-time period.

7.8.9 GAL would operate flights from the northern runway using procedures designed to minimise noise impacts, in line with its current processes and the commitments of the Noise Action Plan. GAL would continue to work with communities, the Noise Management Board and its aviation industry stakeholders to develop ways to minimise noise for all operations at the airport.

7.8.10 An enhanced Noise Insulation Scheme is proposed, providing greater coverage than currently offered. Residents in the highest noise Inner Zone would be offered a full package of acoustic insulation to avoid significant adverse effects, with residents in the Outer Zone being offered a

lesser package but which would also include acoustic ventilation. In addition, assistance for homeowners looking to move from the most affected properties would also be provided.

7.8.11 GAL proposes a noise envelope that would set limits in terms of the areas affected by specified day and night noise levels (or contours). The identified contours have been chosen because they represent the lowest level of observable adverse effects during the day and night. Limiting noise contour areas are proposed at two points in the future as air traffic increases, with the latter being smaller than the former to ensure noise levels reduce in the longer term.

7.8.12 Mitigation for ground noise from aircraft taxiing and within the airfield has been incorporated into the design of the Project including bunding situated at the western end of northern runway, and noise barriers adjoining the bund installed at the western end of the northern runway.

7.8.13 With regards to noise from road traffic, noise barriers have been incorporated in the eastern side of the new highway to reduce the adverse effect of existing high noise levels in Riverside Garden Park and the surrounding residential area.

Potential Significant Effects

7.8.14 Air noise has the potential to affect residents, and other noise sensitive receptors over an area beyond the airport boundary. As aircraft age, airlines replace them with next generation aircraft so that over time the fleet transitions to next generation aircraft and, other things being equal, overall noise levels reduce. The forecasts used for the modelling of noise in the future are based on estimates of how the fleet will transition based on assumptions around airlines' fleet procurement programmes and business models. The 'central case' used in the noise assessment is based on what is considered today to be the most likely rate of fleet transition. However, there is uncertainty around this, particularly at the current time due to the global pandemic and the financial impact on the airlines. Therefore air noise modelling has also been carried out for a 'slower transition fleet' case, based on forecasts in which the rate of fleet transition is delayed by about five years and which would result in higher noise levels than the central case.

7.8.15 The existing northern runway is currently only used when the main runway is unavailable; for example, due to maintenance work at night. In 2018, the northern runway was used by 3,543 flights, and in 2019 it was used for 2,842 flights. The Project would make alterations to the existing northern runway, resulting in increased use of this runway using the same flight paths. The smaller aircraft (below 36 metre wingspan) would use the northern runway. Consequently, any noise impacts of the Project would be the result of increases in noise due to the increased number of flights on the northern runway, rather than new noise impacts over areas previously unaffected. This would therefore avoid the noise impacts often associated with new flight paths.

7.8.16 Air noise has been assessed in 2029, 2032, 2038 and 2047 and the period of highest noise impact is expected to be the 2032 interim assessment year. At this time, the majority of effects would be in the range negligible or minor adverse to negligible or minor beneficial (not significant). The greatest noise increases are predicted mainly to the west but also to the east of the northern runway. Approximately 40 properties to the west on Ifield Road and near Russ Hill have been identified as experiencing increases of 3-6 decibels, which are potentially moderate adverse significant effects. These houses would be eligible for full noise insulation under the proposed new Noise Insulation Scheme to mitigate the potentially significant effects. For all other receptors, increases and decreases in air noise are not predicted to be significant. However, the enhanced noise insulation scheme would offer full noise insulation to homes within the new Inner

Zone and a lesser package but also including acoustic ventilation to a further approximately 3,300 homes in a new Outer Zone. Noise changes at night would be lower than during the day because it is assumed that the current Night Restrictions would continue to cap aircraft numbers and noise quotas in the 23:30 to 06:00 hours period.

7.8.17 A noise envelope is proposed to set limits on noise from future operations at the airport. Noise limits are proposed for two periods, first for the period from when the northern runway opens up to when the noise impacts are expected to be greatest about three years later, and second for when the airport grows to operate at 382,000 commercial air traffic movements and thereafter.

7.8.18 Construction noise has some potential to give rise to significant effects for occupants of those properties closest to the construction works. This will be considered further during the EIA process to identify the effects more fully and to identify mitigation, to be implemented through the Code of Construction Practice.

7.8.19 Mitigation for ground noise from aircraft taxiing and within the airfield has been incorporated into the design of the Project. With this mitigation in place, levels of ground noise are not predicted to be significant for most receptors. Approximately 90 properties at Povey Cross and Charlwood and approximately 10 properties south of the airport may experience up to moderate adverse effects from ground noise. The Noise Insulation Scheme will be offered to mitigate significant effects where the noise levels exceed the significant observed effect level.

7.8.20 Remodelling of the Longbridge, North Terminal and South Terminal roundabouts and associated highways works has the potential to increase noise levels in the adjacent Riverside Garden Park and residential area. Noise barriers have been incorporated in the elevated sections of new highway to reduce the adverse effect of existing high noise levels in Riverside Garden Park and the surrounding residential area. Negligible to minor/moderate beneficial effects are predicted. Significant beneficial effects may arise in some areas.

7.8.21 With respect to cumulative effects, the majority of other development sites are located to the south of the airport. In most cases, they fall within the lower air noise contours bands, and in areas where the Project would slightly reduce air noise levels. There is potential for noise impacts on the future residents of developments as a result of Gatwick Airport's operations, which in some cases would increase or decrease due to the Project. In seeking permission to develop sites for residential use in noisy areas developers are required to consider the potential for noise impacts on future residents and to design the developments with suitable mitigation accordingly.

7.9. Climate Change and Carbon

Introduction

7.9.1 Chapter 15: Climate Change and Carbon of the PEIR evaluates the resilience of the design, construction and operation of the Project to potential climate change impacts; the combined effects of the Project and potential climate change impacts on the receiving environment; and the likely effect of the Project on greenhouse gas emissions.

Assessment Methodology

Climate Change Resilience and In-combination Climate Change Impacts

7.9.2 Information regarding current and projected future climate conditions has been used in assessment of the following:

- Climate Change Resilience: the resilience of the design, construction and operation of the Project to projected future climate change impacts.
- In-combination Climate Change Impacts: the combined effects of the Project and potential climate change impacts on the receiving environment and community.
- Greenhouse Gas Emissions: the likely effect of the Project on emissions.

7.9.3 Three sets of climate data have been assembled:

- current climate conditions - based on observed weather observations;
- future climate scenario for 2020-2049; and
- future climate scenario for 2050-2079.

7.9.4 These climate data sets are based on the most recent and comprehensive climate change projections for the UK. In addition to projections for future climate they also contain a comprehensive set of observed historical climate observations.

Greenhouse Gas Assessment

7.9.5 The greenhouse gas assessment considers the emissions of greenhouse gases arising from the construction and operation of the Project, some of which are emitted within the site boundary, but the majority of which are emitted outside of the boundary. This covers both construction and operational emissions as summarised in the list below:

- For construction emissions, the physical scope extends to the extraction and sourcing of materials nationally and internationally, as well as construction processes within the Project site boundary. Transportation of waste, and transport of workers to the Project also take place outside the Project site boundary.
- For the operational phase, emissions arise from the energy, waste arising and water consumed within the Project site boundary. However, many of the upstream emissions associated with these (eg energy for electricity generation and potable water treatment) are outside the physical boundary of the Project site.
- Emissions from aviation and from surface access during operation also arise outside the physical boundary of the Project site.

7.9.6 In the absence of actual consumption data for specific activities it has been necessary to draw on benchmark information to understand typical operations. The future baseline greenhouse gas emissions (in the absence of the Project) are based on developing forecasts of activity data.

Current Baseline Environment

Climate Change Resilience and In-combination Climate Change Impacts

7.9.7 Information regarding historical climate conditions at Gatwick Airport was obtained from the national observed climate data sets. All the data for the current baseline were obtained from this

source. Baseline data collection included climate averages and information regarding occurrence of extreme weather events, including hot days, frost days, heavy rainfall and dry spells.

Greenhouse Gas Assessment

7.9.8 The baseline refers to Gatwick Airport's greenhouse gas emissions in the calendar year 2018. It draws together information from a range of documents, analyses and sources.

Mitigation Measures

7.9.9 Mitigation measures to reduce greenhouse gas during construction and operation would be implemented across a wide range of emissions sources, including design optimisation, energy strategy, surface access strategies, and airport operations. Best practice construction methods will be followed to mitigate potential impacts from climate change.

7.9.10 In addition to GAL's existing net zero carbon commitments, as set out within their Decade of Change document, GAL are currently developing a detailed Carbon and Climate Change Action Plan, to enable the airport to continue to reduce carbon emissions and to deliver sustainable development.

Potential Significant Effects

7.9.11 The climate change resilience assessment identified several risks as being high or very high during the construction and operational phase of the Project, for example the increased number of very hot days brings the risk of overheating in temporary building accommodation for construction workers, or passengers and staff in operational terminal buildings. A number of measures have been designed as embedded mitigation as part of the other environmental topics which would also reduce the potential for impacts in terms of resilience (eg flood risk mitigation). With such measures in place, significant effects are not likely.

7.9.12 No significant effects have been identified through the in-combination climate change impacts assessment for the construction or operational phases of the Project.

7.9.13 The greenhouse gas assessment has assessed the calculated greenhouse gas emissions arising from the Project and confirms that these would be significant, in line with current guidance which considers all new emissions arising from development as significant. The Project would incorporate a range of embedded environmental design measures that would contribute positively to mitigation of the greenhouse gas emissions associated with the Project. Work to develop mitigation activities remains ongoing, and the impact of these on greenhouse gases will be included in the Environmental Statement.

7.9.14 Next steps will include close working with the Project design teams to confirm the adoption of mitigation measures through design of the airport facilities and highways infrastructure, optimisation of material sourcing and recycling of cut/fill materials, management of construction stage emission, and the adoption of the energy strategy to reduce emissions arising from airport operations. The opportunities to mitigate impacts of the Project through both construction and operation will be collated into the draft Carbon and Climate Change Action Plan, to be published as part of the application for development consent.

7.9.15 On the basis of the assessment undertaken to date it is expected that the Project would not have a material impact on the ability of Government to meet its carbon reduction targets, including carbon budgets as they stand at present.

7.10. Socio-Economics

Introduction

7.10.1 Chapter 16: Socio-Economics of the PEIR considers the potential socio-economic effects of the Project during the construction and operational phases. Socio-economics is a broad topic that includes the assessment of multiple effect types such as new employment, implications for the labour market and population, disruption to business and community activities.

Assessment Methodology

7.10.2 The assessment analyses the potential socio-economic effects of the Project on receptors in up to four separate study areas (ie site, local, labour market and five authorities area[2] – see Figure 9), depending on the nature of the effect being assessed. The study areas are cumulative, so the wider areas incorporate the local areas.

7.10.3 A desk study has been undertaken to identify the existing and future socio-economic conditions within each of the study areas. A range of further sources has been consulted in respect of social and community infrastructure provision as part of the desk study. Economic modelling undertaken for the Project has also informed the assessment.

Current Baseline Environment

7.10.4 The local study area has seen an increase in its total population of 6.7%, growing from 140,798 to 150,244 over the period from 2011- 2019. The population of the labour market area increased by 6.4% over the same period, with the largest growth among residents aged 65 and over, and lowest growth in the working-age population (people aged 16-64) (17.6% and 3% respectively). The five authorities area also saw the number of residents increase from 4,210,913 to 4,489,665 between 2011 and 2019.

7.10.5 In total, there were 111,000 employees within the local study area in 2019. In the labour market area, there were an estimated 1,055,377 people in employment in 2019, while the equivalent in the five authorities area was 2,335,127 people.

7.10.6 Mean workplace earnings in the labour market and five authorities area were all lower than the equivalent resident earnings values as of 2020. The mean values of workplace earnings in the labour market area for full-time workers and total workers were lower than in the five authorities area, while part-time earnings were higher in the labour market area.

7.10.7 In terms of housing, the average price of dwellings sold in the local study area was £319,098 in the year ending in September 2020, representing an increase of 20% since 2015 and 53% since 2010. House prices in the five authorities area vary widely between authorities ranging from £230,000 in Hastings to £600,000 in Elmbridge. With average prices of £319,098 the local study area has slightly higher average prices than Crawley (£295,000).

[2] The five authorities area reflects where the widest socio-economic effects of the Project could impact on receptors.

7.10.8 In 2011, there were 57,531 dwellings in the local study area. In 2019, the total housing stock in the labour market area and five authorities area equated to 918,755 and 1,945,531 dwellings respectively. The total housing stock in both study areas increased by 7.8% and 7.5% respectively between 2009 and 2019, compared with the England average for the period (7.6%).

7.10.9 There are 17 community spaces within the local study area. These serve a range of functions and include local community-owned or operated community centres and public halls, halls or centres owned by or connected to places of worship and halls connected to local Scout or Brownie clubs. There are also a number of open spaces, including public parks and gardens within the local study area. A total of 217 designated open spaces (equating to approximately 544 hectares of open space) are identified within the local study area. Within the Project site boundary or adjacent to it, are three open spaces: an area of urban open space at St. Bartholomew's Church to the north of the A23, a tennis court in Buckingham Gate car park and Riverside Garden Park.

Mitigation Measures

7.10.10 A number of measures have been designed into the Project to reduce the potential for socio-economic impacts.

7.10.11 The Code of Construction Practice will include measures to ensure construction contractors and processes follow practices that minimise disruption. This includes measures such as construction traffic management, set hours of work and alternative access routes. This will inform the preparation of detailed mitigation measures for any other adverse effects on local businesses and the community for the duration of the Project construction phase. The Code of Construction Practice will also detail measures for community engagement.

7.10.12 Funding linked to the operation of the Project is likely to be distributed through measures such as the Gatwick Airport Community Fund and grants for noise insulation. Details on such measures are yet to be confirmed and will be informed through further consultation. Additionally, compensation would be provided to adversely affected stakeholders to help mitigate effects such as business displacement and the viability of community facilities and services during construction.

7.10.13 In terms of enhancement measures, an Employment, Skills and Business Strategy would be adopted to continue and expand activities undertaken by Gatwick to support career entry (for graduates and apprenticeships), training and other work opportunities. These measures would enhance the potential beneficial employment and labour market impacts of the Project. The Project would also include the adoption of a Business Support Strategy to link Gatwick with providers in the supply chain and through local procurement initiatives. These measures would enhance the potential catalytic and wider impacts/benefits of the Project.

Potential Significant Effects

7.10.14 The assessment shows that the Project would generate additional construction jobs which can be filled by the existing and projected labour supply within the labour market area. The Project is expected to generate some disruption to business and residents (eg through changes to traffic and noise levels); however, no significant effects are expected in most cases. The Project is not expected to increase the need for housing above what is already planned for by neighbouring local authorities.

7.10.15 Some significant effects have been identified including beneficial effects through the generation of construction and operational employment across the four different phases of this socio-economic assessment. In particular, within the local study area the Project has been assessed to have a significant beneficial effect on employment at the interim assessment and final design years. There is also a significant beneficial effect identified on the supply chain employment opportunities in the opening year. Some of these effects will be subject to further enhancement measures which will be outlined in further detail at the Environmental Statement stage.

7.10.16 There are also some significant adverse effects identified by the assessment. The first relates to the loss of Open Space (ie less than one hectare of open space) and measures including re-provision of the entire loss and further enhancements to the rest of the open space provision are predicted to mitigate the effect. The second relates to business disruption within the site boundary during the interim year. Mitigation measures would include a detailed construction management plan and a compensation schedule that will address and minimise those impacts. Finally, there are moderate adverse effects on labour market in the local study area identified in the interim assessment and design years. These effects would be mitigated by the Outline Employment, Skills and Business Strategy. In all cases, mitigation would reduce the effects to not significant.

7.10.17 The majority of the developments identified which could potentially result in cumulative effects are estimated to be completed during the early stages of initial construction phase for the Project. Therefore, the construction activity generated by the other proposed developments is unlikely to overlap with the Project. In addition, most of the operational effects for the Project are considered to remain valid and unchanged by the inclusion of the cumulative developments across all the assessment phases.

7.11. Health and Wellbeing

Introduction

7.11.1 Chapter 17: Health and Wellbeing of the PEIR considers the effects of the Project on health and wellbeing and draws from other technical topic assessments (most notably: traffic and transport; air quality; noise and vibration; and socio-economic effects).

7.11.2 The assessment applies a broad socio-economic model of health that encompasses conventional health impacts such as disease, accidents and risk, along with wider socio-economic health determinants vital to achieving good health and wellbeing.

Assessment Methodology

7.11.3 Environmental health determinants (such as changes to air quality and noise exposure) are likely to have a more local impact where potential change in hazard exposure is limited by physical dispersion characteristics. As a result, the local study area for health-specific baseline statistics relating to population and human health effects focuses on the local authority districts of Crawley, Reigate and Banstead, Tandridge, Mid Sussex, Horsham and Mole Valley, using regional and national averages as comparators.

7.11.4 The socio-economic health determinant study area remains consistent with the largest study area and comprises the County areas of East Sussex, West Sussex, Surrey, Kent and Brighton and Hove (five authorities area).

7.11.5 The desk study approach to defining the baseline conditions involved collation and interpretation of published demographic, socio-economic and existing public health and healthcare capacity data. Reports such as the relevant Joint Strategic Needs Assessment reports have been analysed to provide additional context on local health circumstances, inequalities and public health priorities (health protection, health promotion and health care). These reports partly draw from the open source websites and datasets detailed above.

Current Baseline Environment

7.11.6 The age structure in the local and wider study areas is relatively top-heavy, with a higher proportion of the population aged 5 to 14 years and aged 40 to 80+ years, and a lower proportion of the population aged 15 to 34 when compared to the national average. Total population growth in the local and wider study areas between the years of 2011 and 2019 have exceeded the national average by 0.7% and 0.6%, respectively.

7.11.7 Male and female life expectancy and healthy life expectancy (ie the amount of years spent in good health) in the local study area are both higher than the regional and national averages. Life expectancy and healthy life expectancy for males and females in the wider study area are also higher than the national average but are more comparable to the regional average.

7.11.8 The existing airport has an airport based paramedic on-site between the hours of 06.00 and 00.00. The paramedic is supported by 290 staff members who are trained to provide first aid. This figure excludes first aiders located in every commercial outlet with between 5-50 members of staff. In addition, there is a total of 56 Automated External Defibrillators located within the airport. As such, the airport is well prepared to respond, treat, and if required call for emergency assistance from the South East Coast Ambulance Trust. An example of the existing effectiveness of treatment is that Automated External Defibrillators treatment success rate is more than six times greater than the national average.

Mitigation Measures

7.11.9 Generally, mitigation focusses on limiting environmental precursors to preclude adverse health outcomes. As a result, any adopted mitigation measures are detailed within the relevant topic sections, including the Code of Construction Practice.

7.11.10 On-site health care would be provided for construction workers to avoid any potential adverse impact on the local health care system. As mentioned previously, enhancement measures implemented as part of the Project would include a series of training, employment and procurement initiatives that would aid in addressing existing local barriers to a range of employment opportunities locally.

Potential Significant Effects

7.11.11 Overall, no significant health and wellbeing effects (adverse or beneficial) have been identified during the initial construction phase for the range of determinants assessed. Potential health and wellbeing effects from changes in environmental health determinants assessed (ie air quality and transport nature/flow rate) are considered to be minor adverse on the basis that impacts would generally be temporary, intermittent and managed through the implementation of best practice construction methods. In addition, health and wellbeing effects from changes in exposure to

temporary lighting have been explored but predicted to have no change on the basis that no residential receptors would be impacted.

7.11.12 The first full year of runway opening (2029) and the interim assessment year (2032) would include a combination of construction and operation-related health and wellbeing effects. However, health and wellbeing effects associated with environmental determinants (ie air quality, noise and transport) would remain not significant. Similarly, there would be no significant change in exposure to temporary or permanent lighting for residential receptors. Health and wellbeing effects from changes in lifestyle factors would remain minor beneficial and not significant in both assessment scenarios.

7.11.13 The significance of health and wellbeing effects from changes in socio-economic factors (ie employment) would increase from minor beneficial in the first full year of opening (2029) to moderate beneficial in the interim assessment year (2032), which is considered significant in EIA terms. This is primarily due to the magnitude of indirect and induced job opportunities expected to be provided.

7.11.14 Finally, the design year (2038) is an operation only scenario. Health and wellbeing effects associated with environmental determinants would remain not significant. Operational employment opportunities (direct, indirect and induced) would reach their peak and continue to have moderate beneficial health and wellbeing effects, which are considered to be significant. There would no longer be a construction workforce, so any changes to healthcare capacity would be limited to emergency call outs associated with increased passenger throughput which would not be significant on the basis that any change is intended to be managed internally.

7.11.15 Based on the information available regarding other proposed developments at this stage, no potential for significant cumulative effects has been identified.

7.12. Agricultural Land Use and Recreation

Introduction

7.12.1 Chapter 18: Agricultural Land Use and Recreation of the PEIR considers the potential effects of the Project on agricultural land use and recreational resources, including areas of public open space, public rights of way and other linear recreational routes during its construction and operational phases. Specifically, the chapter assesses the potential effects on the following resources during the construction and operational stages of the Project:

- agricultural land quality and soils;
- farm holdings;
- public rights of way;
- national cycle routes;
- other walking, cycling and horse riding routes; and
- public open space.

Assessment Methodology

7.12.2 A desk study has been undertaken in relation to soils, agricultural land classification and farm holdings within the study area.

7.12.3 In addition to the desk study information on agricultural land use and soils, the assessment has been informed by site visits and detailed agricultural land classification survey work in agricultural areas that would be potentially temporarily or permanently affected by the Project. A recreational survey was undertaken along National Cycle Route 21 which runs through the north eastern area of Riverside Garden Park adjacent to the Gatwick Stream, on three occasions between May and August 2019 to ascertain the nature of the use of this area of public open space.

Current Baseline Environment

7.12.4 The agricultural land affected by the Project comprises predominantly poorly drained clayey soils. These soils are limited in their agricultural quality by a wetness and workability limitation. According to the Agricultural Land Classification Guidelines they are graded entirely as lower quality Subgrade 3b or Grade 4 agricultural land, with no land being defined as the best and most versatile (Grades 1, 2 or 3a) land.

7.12.5 The agricultural land is characterised by a high proportion of grassland use in the vicinity of Gatwick Airport, with the land holdings around the airport used mainly for livestock based farming enterprises and for horse grazing. A total of seven land holdings, including land owned by Gatwick Airport, could be permanently affected by the Project.

7.12.6 There is a network of public rights of way within the Project site boundary, including those public footpaths along which the Sussex Border Path runs (see Figure 10). Other linear recreational routes include the Millennium Trail which largely follows the same route as the Sussex Border Path and finishes in Riverside Garden Park, and the long distance National Cycle Route 21. This cycle route runs south from Greenwich to Eastbourne and runs northwards between the A23 London Road and the railway line as a traffic free route to the east of the main airport campus, under the A23 and through Riverside Park in Horley. Riverside Garden Park in Horley is designated as urban open space of high value by Reigate and Banstead Borough Council and forms part of the Riverside Green Chain. It is located on the south western edge of Horley between areas of residential development to the north east and the A23 and Gatwick Airport to the south west. It is bounded to the north by the Gatwick Stream and includes areas of amenity grassland, woodland and a man-made lake. A recreational survey undertaken within Riverside Garden Park indicates that it is a well-used resource by local residents and workers, as well as travellers using Gatwick Airport.

Mitigation Measures

7.12.7 A number of measures have been designed in to the Project to reduce the potential for impacts on agricultural land use and recreation. Mitigation measures include:

- implementation of a soil management strategy, including monitoring, to ensure the conservation of all soils;
- implementation of measures to reduce, as far as possible, the effect of construction activities on farm holdings;
- provision of replacement public open space to mitigate for the loss of land within Riverside Garden Park;
- improvement/enhancement of current public open space facilities;
- provision of a permanent diversion to the Sussex Border Path to the south of the A23 from the new North Terminal roundabout;
- provision of pedestrian route linkages; and

- implementation of management measures to maintain safe public access along public rights of way.

7.12.8 An enhancement measure comprises the provision of a new recreational route around a new flood mitigation area provide a circular route opportunity to local communities with the aim of promoting health and well-being.

Potential Significant Effects

7.12.9 No effects on agricultural land use are anticipated to be significant during the construction or operational phases of the Project.

7.12.10 During the initial construction phase (2024-2029), there is the potential for disruption to access along the Sussex Border Path and three public footpaths as a result of the commencement of the highway improvement works. In addition, it is proposed that a number of public access improvements would be implemented to provide health and well-being benefits to the local community and the public generally, including the provision of new circular recreational route around the flood compensation area to the east of Museum Field, with a link to the existing alignment of the Sussex Border Path.

7.12.11 There is also the potential for the disruption to the existing public footpath that runs along the boundary of the Pentagon Field during the construction activities associated with the new surface car parking. It is proposed that this route is maintained along its existing alignment outside the perimeter fencing on the construction site for the safety of pedestrians.

7.12.12 Taking all these factors into account, the temporary effect on public rights of way during construction is assessed to be of minor adverse significance, and the overall effect on recreational routes and facilities during operation is assessed to be of permanent minor beneficial significance.

7.12.13 The improvement works associated with the proposed new grade separated junction to serve the North Terminal may encroach into the southern fringe of Riverside Garden Park. This would result in permanent loss of approximately 0.75 hectares of public open space within these areas (a moderate adverse effect) and would impact on a section of the Sussex Border Path to the south of the A23.

7.12.14 To mitigate for these impacts the following measures have been incorporated into the Project design.

- New areas of public open space would be created totalling a minimum of 0.75 hectares or equivalent to the area of public open space lost as a result of the Project.
- A commitment would be given towards improvements/enhancements within Riverside Garden Park.
- A permanent on-airport diversion for the affected section of the Sussex Border Path which would be put in place prior to the commencement of construction works.
- Provision of a pedestrian link between the footway on the northern side of the A23 footway near the Longbridge Roundabout into Riverside Garden Park.
- Provision of an additional pedestrian route linking Riverside Garden Park with the Sussex Border Path to the north of the A23.

7.12.15 Taking these factors into account, the effect on the areas of public open space in Riverside Garden Park, is assessed to be of moderate adverse significance and significant; and the effect on the Sussex Border Path is assessed to be of permanent minor beneficial significance.

7.12.16 No further effects on recreational resources are anticipated to be significant as a result of the operation of the Project from 2038.

7.12.17 The assessment identified that the Project is not anticipated to contribute to any significant cumulative effects.

8 Further Information

8.1.1 The full PEIR, including this Non-Technical Summary can be viewed at the following locations.

DEPOSIT LOCATIONS	OPENING TIMES *(correct at time of publication)* MON	TUE	WED	THU	FRI	SAT	SUN
Crowborough Community Centre, Pine Grove, Crowborough, TN6 1FE	8am - 1pm						⊗
Uckfield Library, Library Way, High Street, Uckfield, TN22 1AR	10am - 1pm	10am - 4.30pm	2pm - 4.30pm	10am - 6pm	10am - 4.30pm		⊗
Tunbridge Wells Library, Level 1, Royal Victoria Place Shopping Centre, Tunbridge Wells TN1 2SS	9am - 6pm					9am - 5pm	10.30am - 4pm
Edenbridge Library, The Eden Centre, Four Elms Road, Edenbridge, TN8 6BY	9am - 1pm	9am - 5pm			1pm - 5pm	10am - 3pm	⊗
Dorking Library, St Martin's Walk, Dorking, RH4 1UT	9.30am - 5.30pm					9.30am - 5pm	⊗
Leatherhead Library, The Mansion, 68 Church Street, Leatherhead, KT22 8DP	⊗	9.30am - 5pm					⊗
Reigate and Banstead Town Hall, Castlefield Road, Reigate, Surrey, RH2 0SH	8.45am - 5pm				8.45am - 4.45pm	⊗	⊗
Horley Library, 55-57 Russell Square, Victoria Road, Horley, RH6 7QH	⊗	9.30am - 5pm					⊗
Oxted Library, 12 Gresham Road, Oxted, RH8 0BQ	⊗	9.30am - 5pm					⊗
Caterham Valley Library, Stafford Road, Caterham, Surrey, CR3 6JG	⊗	9.30am - 5pm					⊗
Crawley Library, Southgate Avenue, Crawley, RH10 6HG	9am - 6pm					9am - 5pm	⊗
Broadfield Library, 46 Broadfield Place, Crawley, RH11 9BA	10am - 5pm					10am - 2pm	⊗
Horsham Library, Lower Tanbridge Way, Horsham, RH12 1PJ	9am - 6pm					9am - 5pm	⊗
Billingshurst Library, Mill Lane, Billingshurst, RH14 9JZ	10am - 5pm					10am - 2pm	⊗
Mid Sussex District Council, Oaklands, Oaklands Road, Haywards Heath, RH16 1SS	8.45am - 5.15pm				8.45am - 4.15pm	⊗	⊗
East Grinstead Library, 32 - 40 West Street, East Grinstead, RH19 4SR	9.30am - 6pm					9.30am - 5pm	⊗
Jubilee Library, Jubilee Street, Brighton, BN1 1GE	10am - 5pm						11am - 5pm
Westdene Library, 24 Bankside, Brighton, BN1 5GN	9am – 5pm					9.30am - 5pm	11am - 5pm

8.1.2 Copies of the PEIR can be requested by post from:

FREEPOST reference RTRB-LUUJ-AGBY

8.1.3 Or through the Project website, by phone or by email at:

- www.gatwickairport.com/futureplans;
- feedback@gatwickfutureplans.com; or
- 0800 038 3486 during normal business hours (Monday to Friday, 9am to 5.30pm).

8.1.4 A charge will be made for paper copies.

9 Next Steps

9.1.1 This Non-Technical Summary provides a summary of the PEIR that forms part of the pre-application consultation for the proposal to make best use of Gatwick Airport's existing runways.

9.1.2 The PEIR has been published as part of the consultation process, which also includes a series of community consultation events in accordance with the process set out in the Statement of Community Consultation.

9.1.3 Following consultation on the PEIR, all consultation responses received will be reviewed and taken into account in the ongoing EIA and Project design processes and, ultimately, the production of the final Environmental Statement to be submitted with the application for development consent.

9.1.4 At the time the application for development consent is submitted to the Planning Inspectorate, details of the consultation undertaken during the preparation of the application will be set out in a Consultation Report. The Consultation Report will be submitted alongside the final Environmental Statement at the time of application.

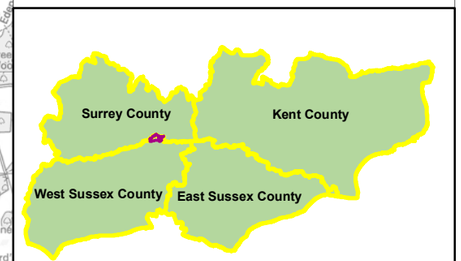
10 Glossary

Term	Description
EIA	Environmental Impact Assessment
GAL	Gatwick Airport Limited
mppa	million passengers per annum
NPS	National Policy Statement
PEIR	Preliminary Environmental Information Report

YOUR LONDON AIRPORT Gatwick

KEY

- Project Site Boundary (PEIR)
- District Boundary
- County Boundary



DOCUMENT

Preliminary Environmental Information Report Non-Technical Summary

DRAWING TITLE

County and District Boundaries

DATE

September 2021

ORIENTATION	DRAWING NO.	REVISION
N	FIGURE 1	For PEIR Issue
	DRAWN BY: CR	PM / CHECKED BY: JT

SCALE @ A3 1:60,000

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YOUR LONDON AIRPORT Gatwick

KEY

- Project Site Boundary (PEIR)
- Land in the Ownership of Gatwick Airport

DOCUMENT

Preliminary Environmental Information Report Non-Technical Summary

DRAWING TITLE

Project Site Boundary

DATE

September 2021

ORIENTATION	DRAWING NO.	REVISION
N	FIGURE 2	For PEIR Issue
	DRAWN BY: CR	PM / CHECKED BY: AR

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YOUR LONDON AIRPORT Gatwick

KEY

- Project Site Boundary (PEIR)
- Runway or taxiway
- Terminals and piers
- Stands
- Aircraft Hangar
- Airport Fire Station
- CARE / Motor Transport / Surface Transport / Grounds Maintenance
- Cargo Facility
- Fire Training Ground
- Air Traffic Control Tower
- Noise mitigation (environmental bund)
- Larkins Road
- Fuel Farm
- Substation

DOCUMENT

Preliminary Environmental Information Report Non-Technical Summary

DRAWING TITLE

Existing Airfield Infrastructure

DATE

September 2021

ORIENTATION	DRAWING NO.	REVISION
N	FIGURE 3a	For PEIR Issue
	DRAWN BY: BG	PM / CHECKED BY: NB

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YOUR LONDON AIRPORT Gatwick

KEY

- Project Site Boundary (PEIR)
- Car parks within the GAL estate
- Hotel
- Inter-terminal transit system stations
- Inter-terminal transit system track
- Gatwick Railway Station

DOCUMENT

Preliminary Environmental Information Report Non-Technical Summary

DRAWING TITLE

Existing Supporting Airport and Highways Infrastructure

DATE

September 2021

ORIENTATION	DRAWING NO.	REVISION
N	FIGURE 3b	For PEIR Issue
	DRAWN BY: BG	PM / CHECKED BY: NB

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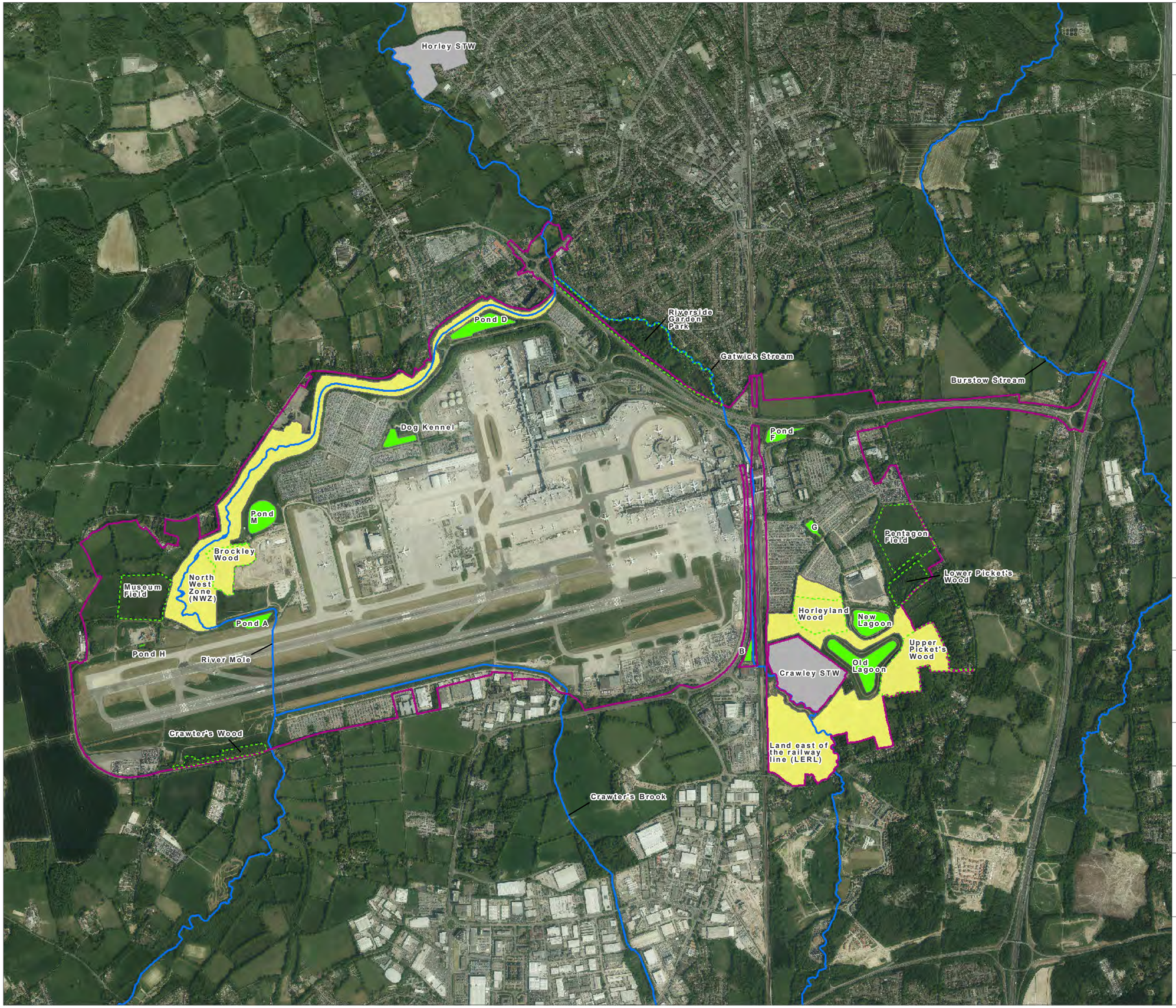

YOUR LONDON AIRPORT Gatwick

KEY

- Project Site Boundary (PEIR)
- Environmental feature / location identified in PEIR
- Gatwick Biodiversity Area
- Sewage Treatment Work
- River
- Artificial waterbody

DOCUMENT

Preliminary Environmental Information Report Non-Technical Summary

DRAWING TITLE

Existing Location / Environmental Features Identified in PEIR

DATE

September 2021

ORIENTATION	DRAWING NO.	REVISION
N	Figure 3c	For PEIR Issue
	DRAWN BY: CR	PM / CHECKED BY: NB

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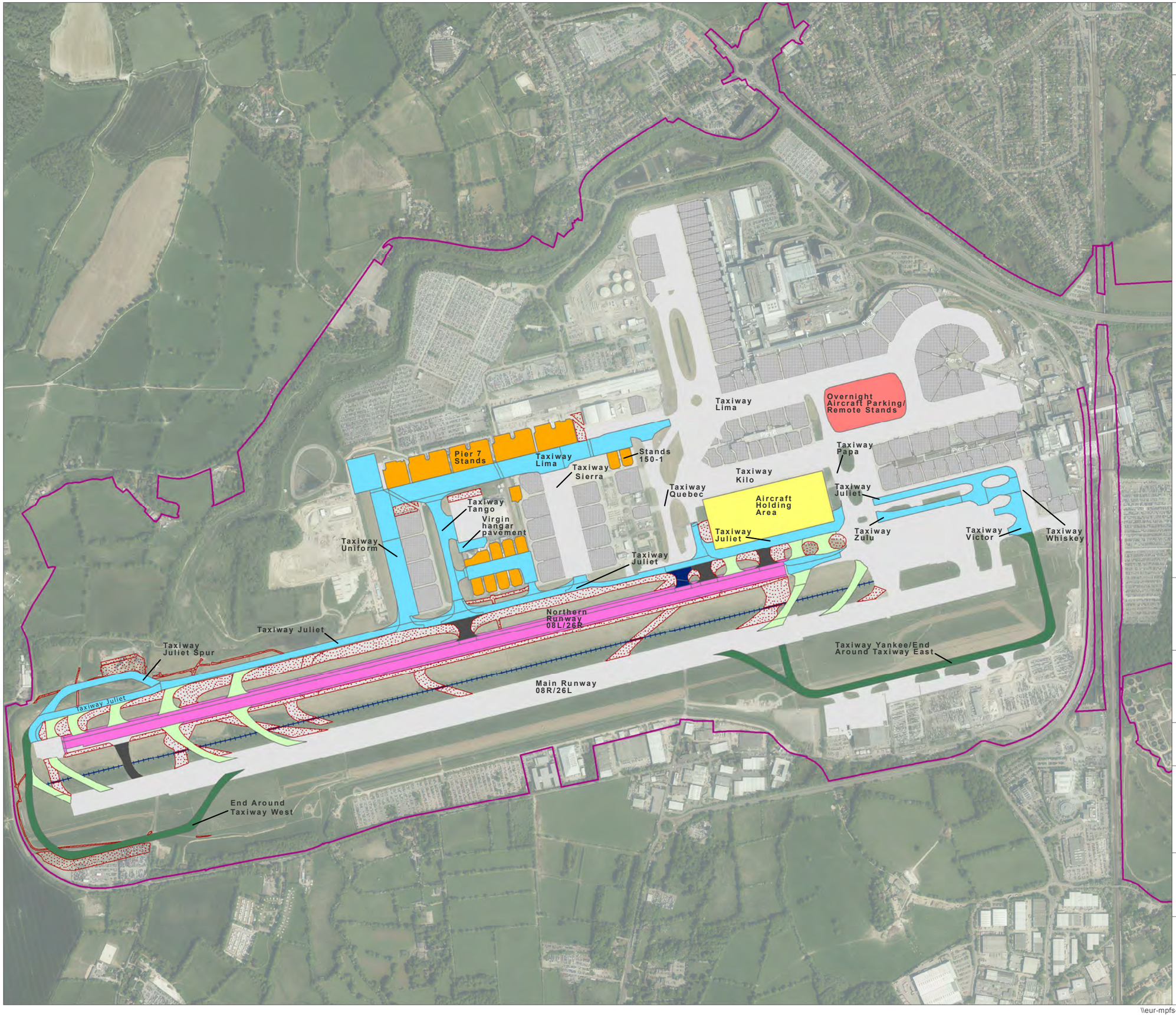

YOUR LONDON AIRPORT Gatwick

Project Site Boundary (PEIR)

Existing

- Existing stands
- Existing exit/entrance taxiway
- Existing taxiway

Northern Runway Project

- Existing taxiway to be replaced with grass
- Overnight parking/remote stands
- Northern Runway 08L/26R
- End Around Taxiways
- Taxiway
- Modified exit/entrance taxiway
- Stands
- Aircraft Holding Area
- New exit/entrance taxiway
- East-West track between runways

DOCUMENT

Preliminary Environmental Information Report Non-Technical Summary

DRAWING TITLE

Airfield/Airport Works Sheet 1

DATE

September 2021

ORIENTATION	DRAWING NO.	REVISION
N	FIGURE 4a	For PEIR Issue
	DRAWN BY: MS	PM / CHECKED BY: AR

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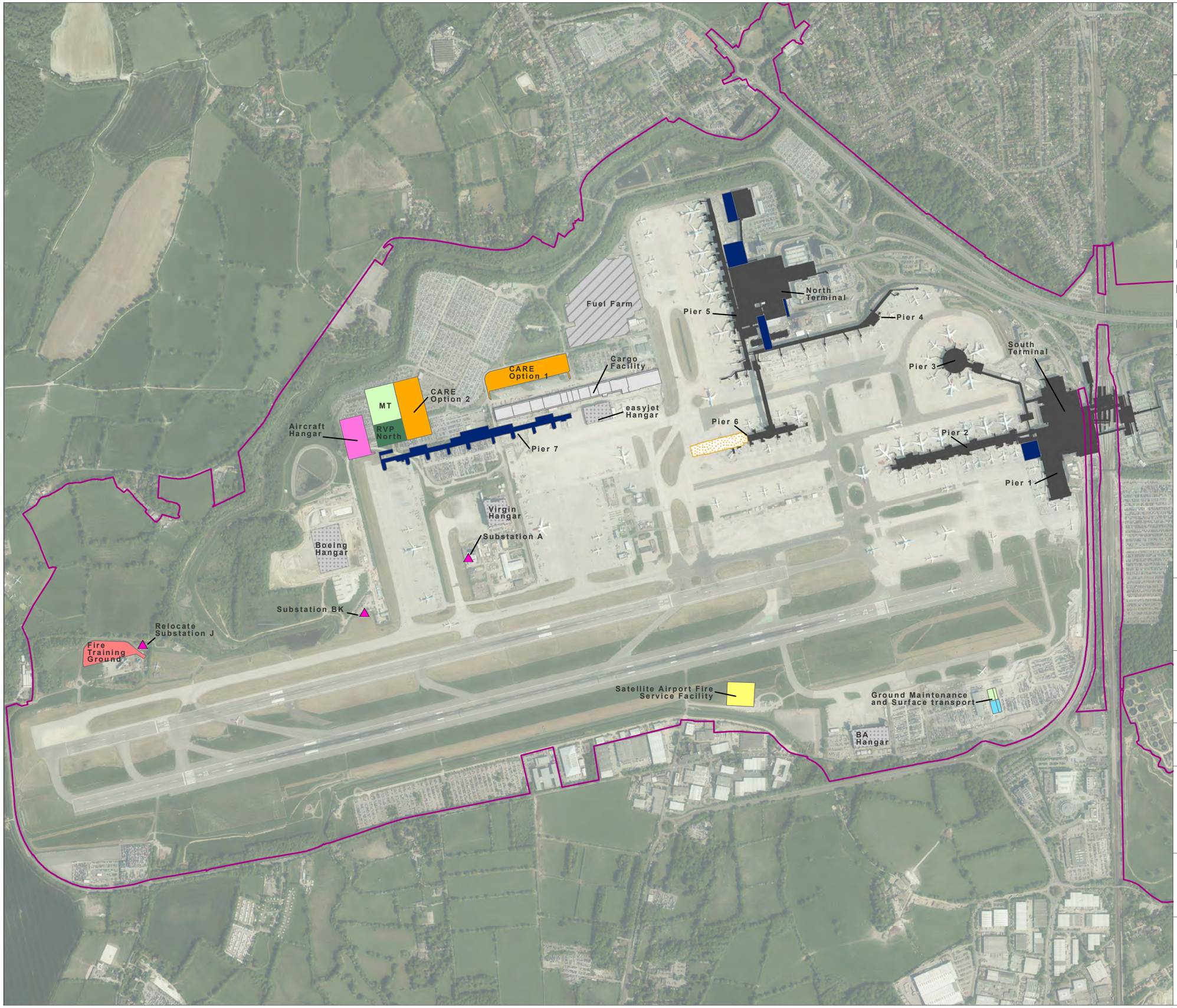

YOUR LONDON AIRPORT Gatwick

Project Site Boundary (PEIR)

Existing

- Terminal buildings
- Fuel Farm
- Cargo facility buildings
- Hangar

Future Baseline

- Pier 6 West Extentsion

Northern Runway Project

- Terminal works
- Hangar
- Relocation of Fire Training Ground
- Relocation of Ground Maintenance and Surface transport
- Substation
- Relocation of Surface transport
- Central Area Recycling Enclosure (CARE)
- Rendezvous point north
- Satellite Airport Fire Service Facility provision south of main runway

DOCUMENT

Preliminary Environmental Information Report
Non-Technical Summary

DRAWING TITLE

Airfield/Airport Works
Sheet 2

DATE

September 2021

ORIENTATION	DRAWING NO.	REVISION
N	FIGURE 4a	For PEIR Issue
	DRAWN BY: MS	PM / CHECKED BY: AR

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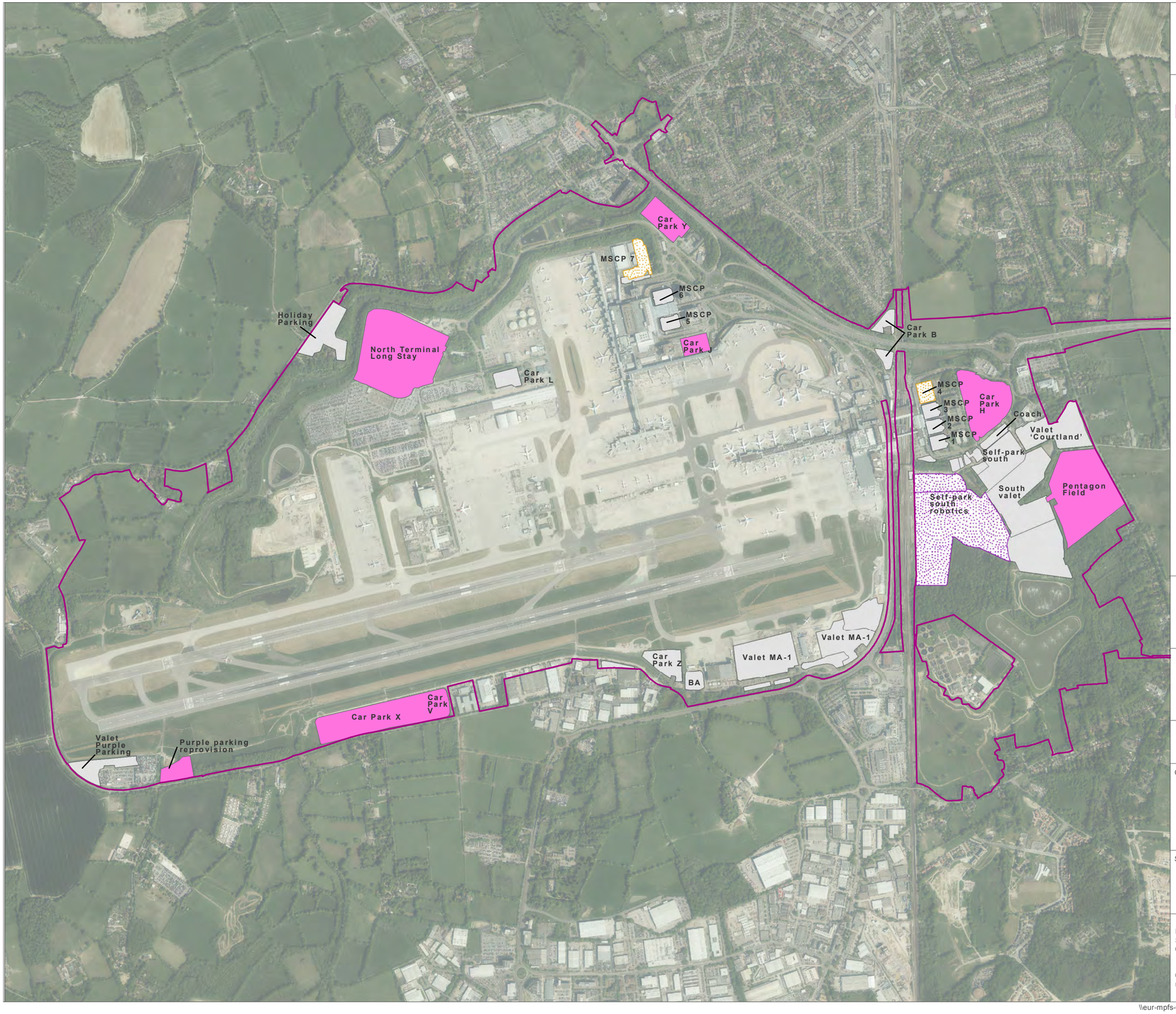

YOUR LONDON AIRPORT Gatwick

KEY

- Project Site Boundary (PEIR)

Existing

- Gatwick Airport Car Park

Future Baseline

- Self-park south robotics
- Car park

Northern Runway Project

- Car Park

DOCUMENT

Preliminary Environmental Information Report
Non-Technical Summary

DRAWING TITLE

Car Parks

DATE

September 2021

ORIENTATION	DRAWING NO.	REVISION
N	FIGURE 4b	For PEIR Issue
	DRAWN BY: MS	PM / CHECKED BY: AR

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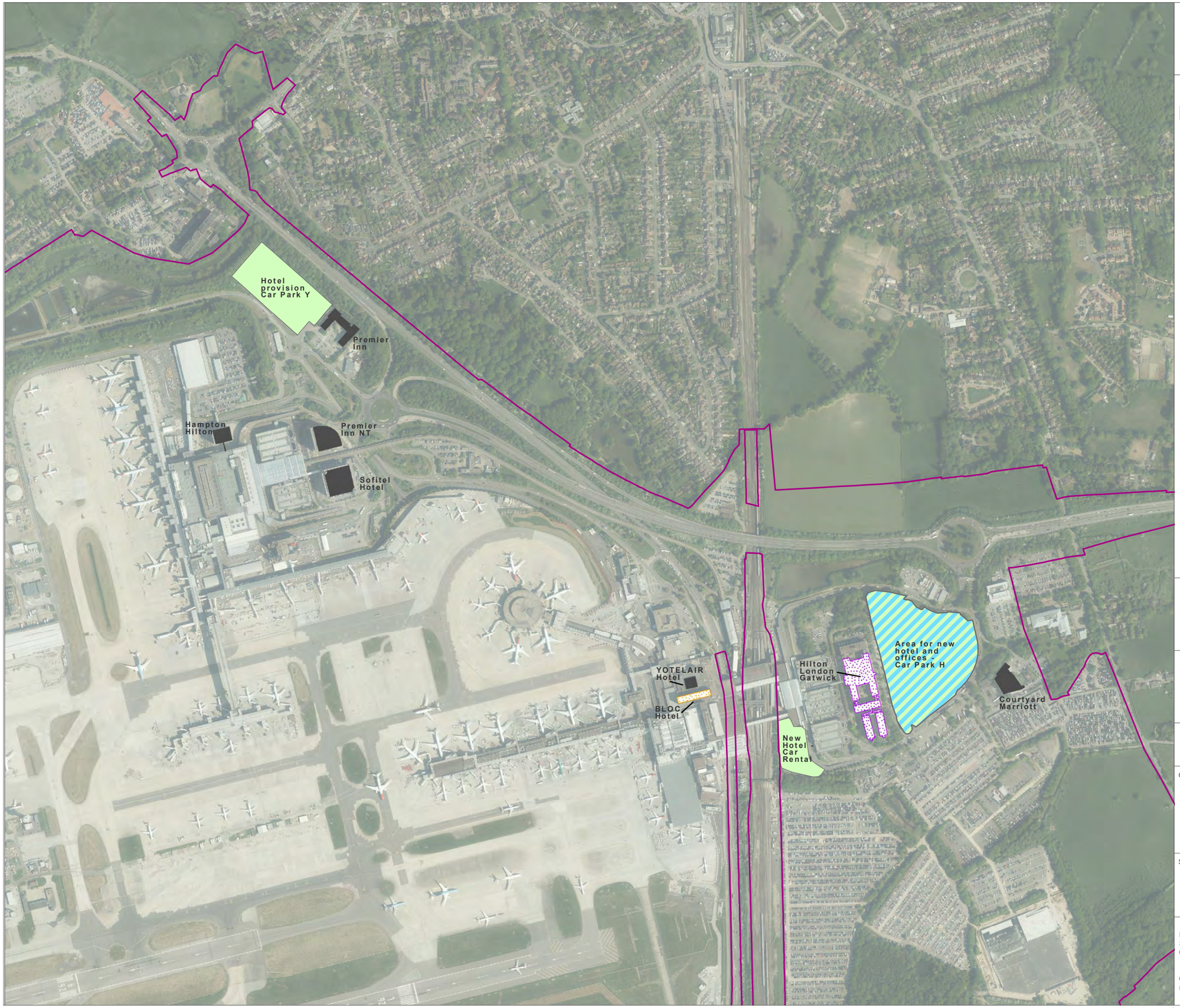

YOUR LONDON AIRPORT Gatwick

KEY

- Project Site Boundary (PEIR)

Existing

- Hotel

Future Baseline

- BLOC Hotel
- Hilton London Gatwick

Northern Runway Project

- Area for hotel provision
- Area for new hotel and offices

DOCUMENT

Preliminary Environmental Information Report Non-Technical Summary

DRAWING TITLE

Hotels and Commercial Elements

DATE

September 2021

ORIENTATION	DRAWING NO.	REVISION
N	FIGURE 4c	For PEIR Issue
	DRAWN BY: MS	PM / CHECKED BY: AR

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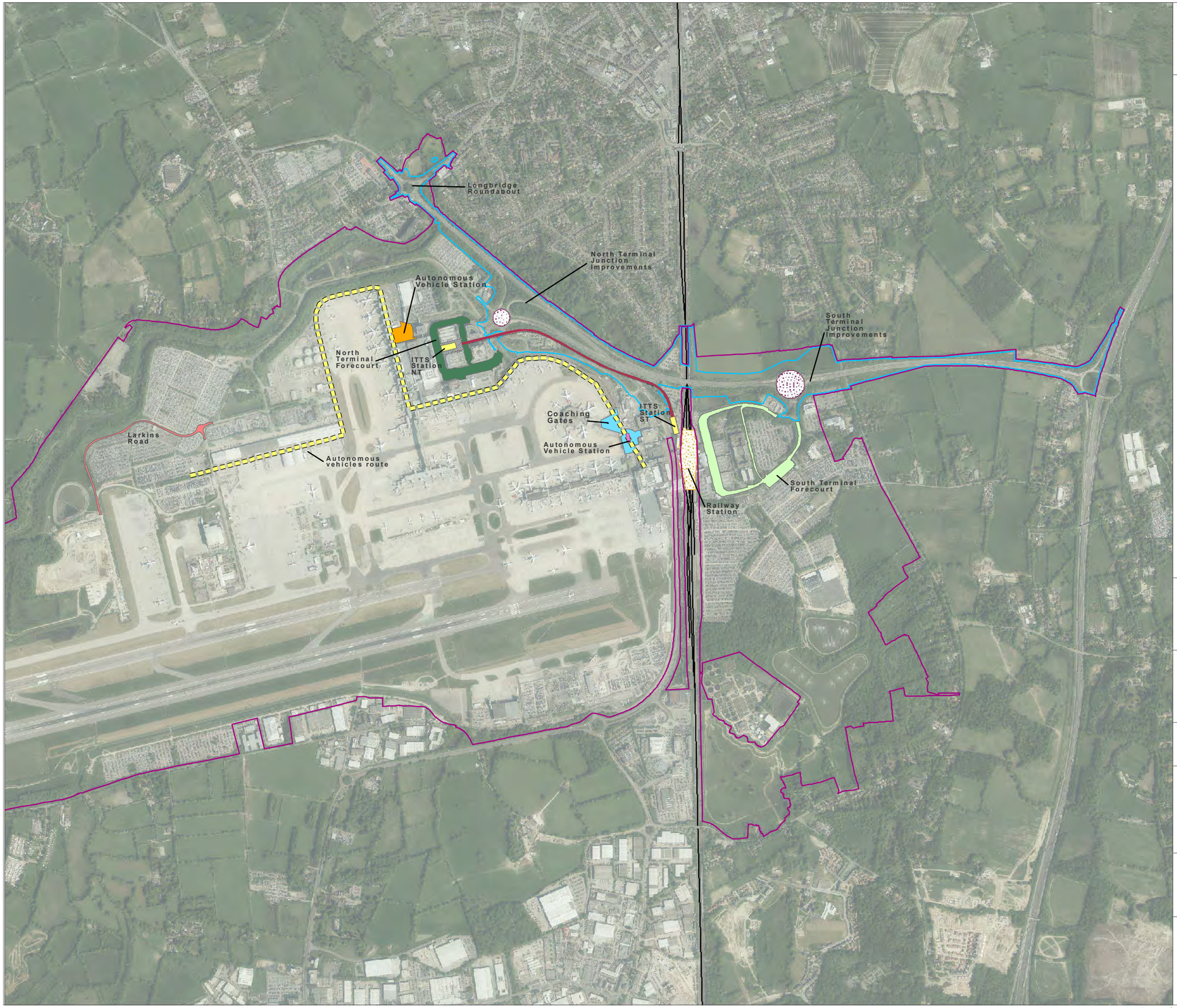

YOUR LONDON AIRPORT Gatwick

KEY

- Project Site Boundary (PEIR)

Existing

- Inter-Terminal Transit System Stations
- Inter-Terminal Transit System track

Future Baseline

- Gatwick Railway Station
- Junction Signalisation

Northern Runway Project

- Proposed Highway Improvement Works
- North Terminal Forecourt
- South Terminal Forecourt
- Inter Terminal Transit System station works
- North Terminal autonomous Vehicle Station
- South Terminal autonomous vehicles station
- South Terminal Coaching Gates
- Larkins Road diversion
- Autonomous vehicles route

DOCUMENT

Preliminary Environmental Information Report Non-Technical Summary

DRAWING TITLE

Surface Access Improvements

DATE

September 2021

ORIENTATION	DRAWING NO.	REVISION
N	FIGURE 4d	For PEIR Issue
	DRAWN BY: MS	PM / CHECKED BY: AR

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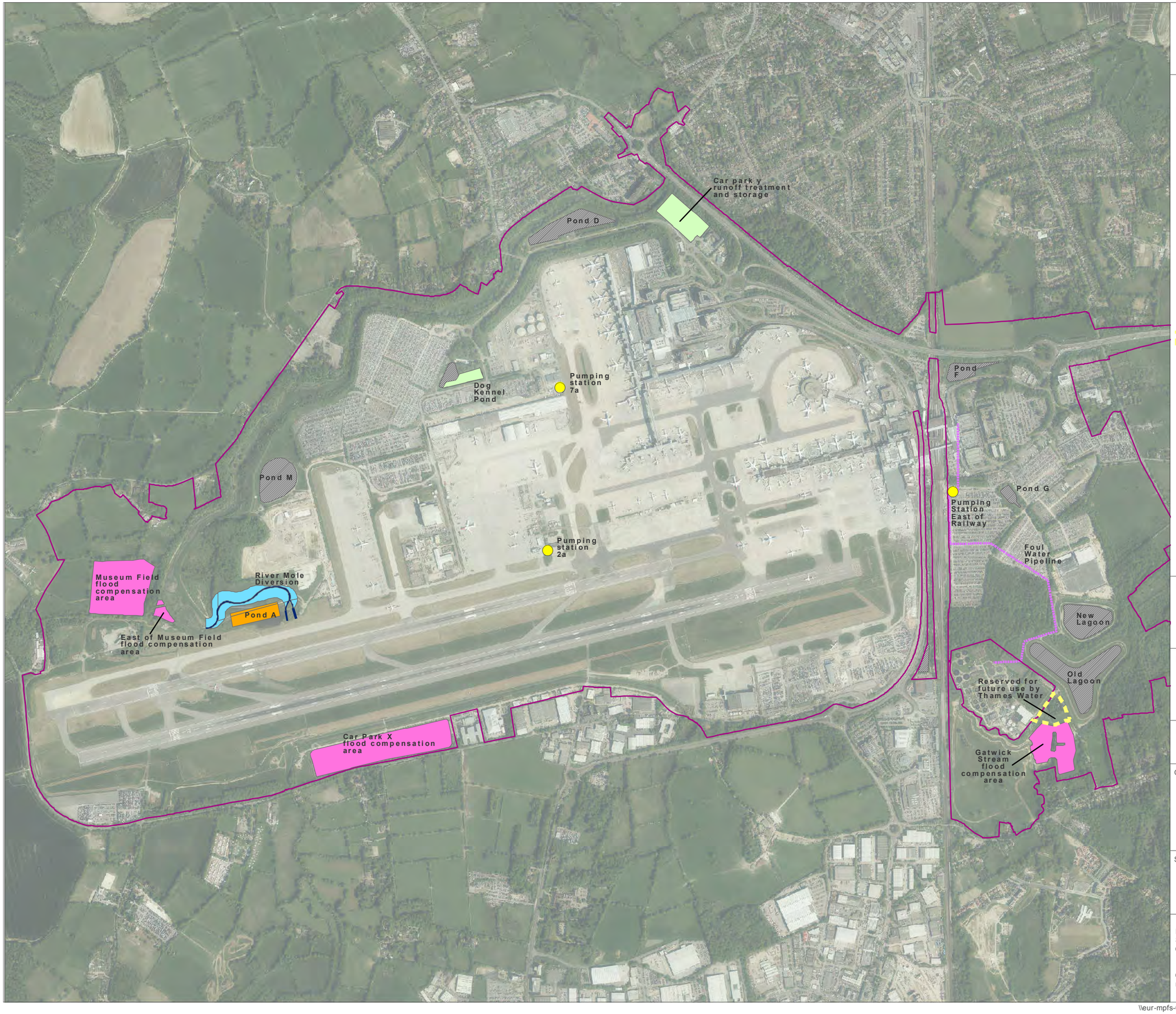

YOUR LONDON AIRPORT Gatwick

KEY

- Project Site Boundary (PEIR)

Existing

- Artificial waterbody

Northern Runway Project

- Water storage
- Water treatment
- Water treatment and storage
- Flood compensation / Storage Areas
- River Mole Diversion
- River Mole Diversion - secondary channel flood compensation
- Reserved for future use as waste water treatment by Thames Water
- Foul water pipeline
- Pumping station

DOCUMENT

Preliminary Environmental Information Report
Non-Technical Summary

DRAWING TITLE

Surface Water and Foul Water Improvements

DATE

September 2021

ORIENTATION	DRAWING NO.	REVISION
N	FIGURE 4e	For PEIR Issue
	DRAWN BY: MS	PM / CHECKED BY: AR

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YOUR LONDON AIRPORT Gatwick

KEY

Project Site Boundary (PEIR)

Northern Runway Project

Principal Construction Compounds

DOCUMENT

Preliminary Environmental Information Report Non-Technical Summary

DRAWING TITLE

Principal Construction Compounds

DATE

September 2021

ORIENTATION	DRAWING NO.	REVISION
N	FIGURE 4f	For PEIR Issue
	DRAWN BY: MS	PM / CHECKED BY: AR

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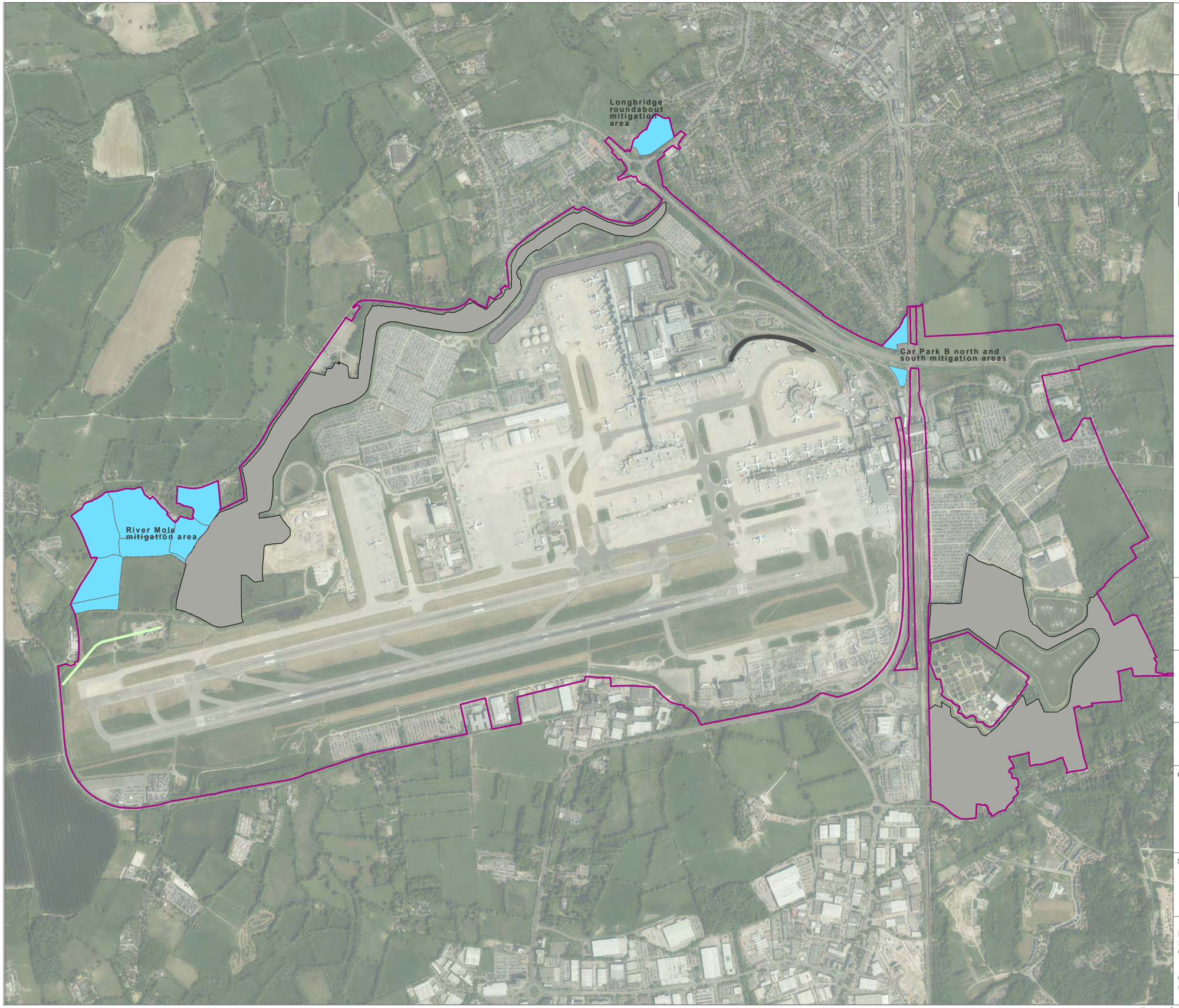

YOUR LONDON AIRPORT Gatwick

KEY

- Project Site Boundary (PEIR)

Existing

- Gatwick Biodiversity Area
- Noise mitigation (environmental bund)
- Noise wall

Northern Runway Project

- Potential Environmental Mitigation and Enhancement Areas
- Noise mitigation

DOCUMENT

Preliminary Environmental Information Report Non-Technical Summary

DRAWING TITLE

Potential Environmental Mitigation and Enhancement Areas

DATE

September 2021

ORIENTATION	DRAWING NO.	REVISION
N	FIGURE 4g	For PEIR Issue
	DRAWN BY: MS	PM / CHECKED BY: AR

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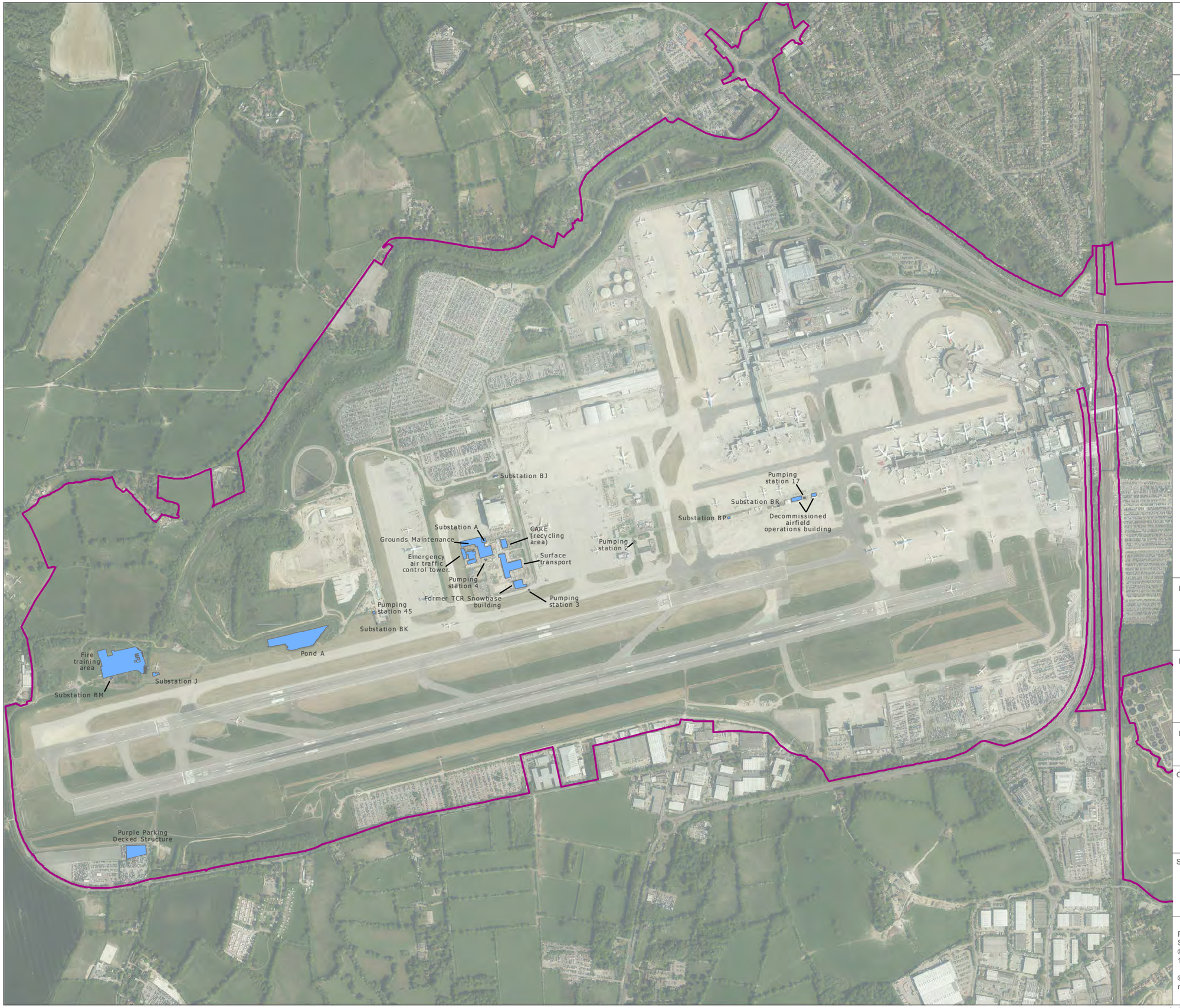

YOUR LONDON AIRPORT Gatwick

Project Site Boundary (PEIR)

DOCUMENT

Preliminary Environmental Information Report Non-Technical Summary

DRAWING TITLE

Existing Facilities to be Demolished or Removed

DATE

September 2021

ORIENTATION	DRAWING NO.	REVISION
N	FIGURE 4h	For PEIR Issue
	DRAWN BY: MS	PM / CHECKED BY: AR

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YOUR LONDON AIRPORT Gatwick

KEY

- Project Site Boundary (PEIR)
- 1km buffer from Project Site Boundary
- Scheduled Monument
- Grade I Listed Building
- Grade II* Listed Building
- Grade II Listed Building
- Locally Listed Building
- Conservation Area

1 - Charlwood Park Farmhouse
2 - Edgeworth House
3 - Wing House
4 - Church Road
5 - Church of St Bartholomew
6 - Ye Olde Six Bells
7 - Tinsley Green Medieval Settlement
8 - Thunderfield Castle

DOCUMENT

Preliminary Environmental Information Report Non-Technical Summary

DRAWING TITLE

Designated Heritage Assets within 1 km of the Project Site Boundary

DATE

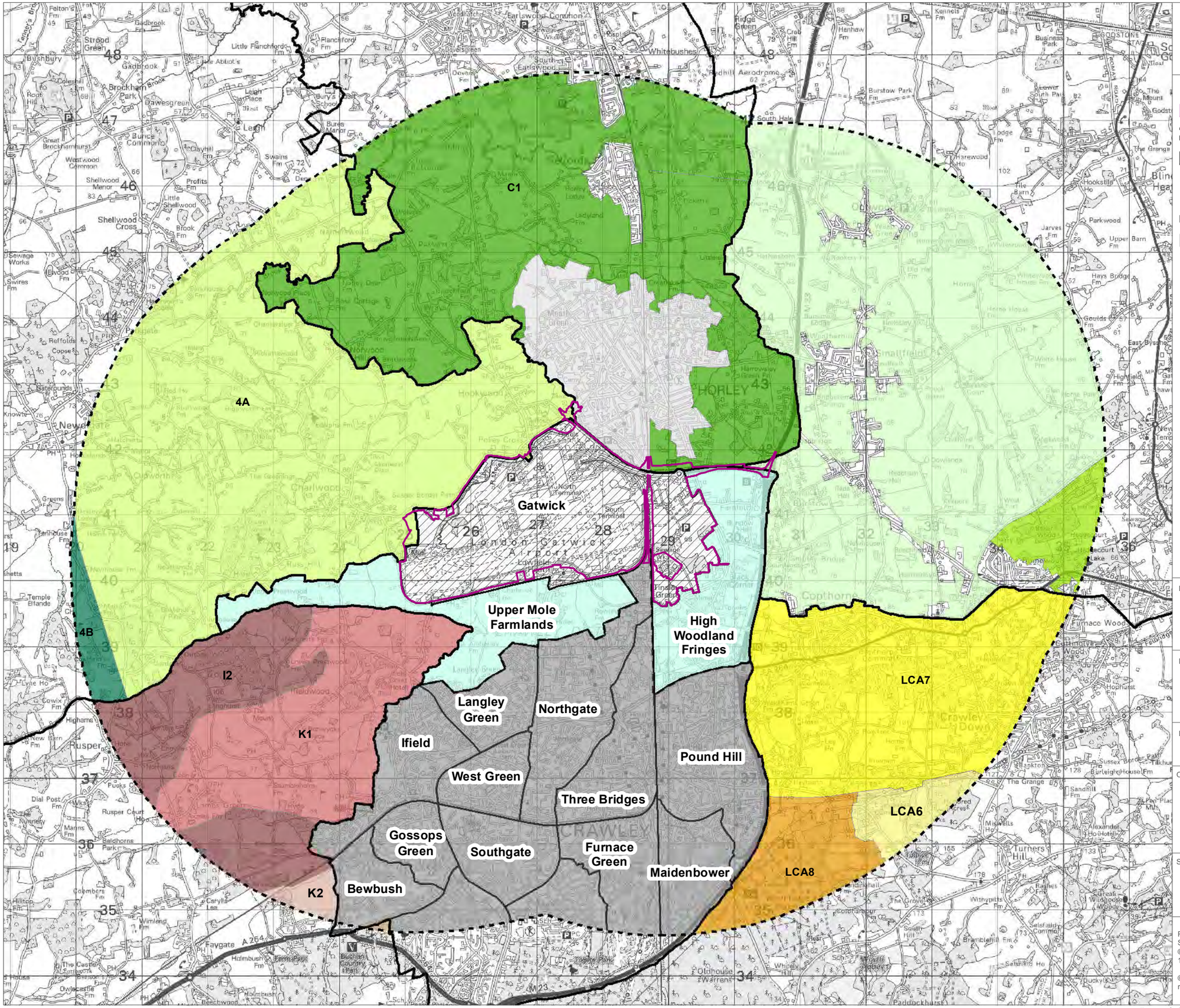
September 2021

ORIENTATION	DRAWING NO.	REVISION
N	FIGURE 5	For PEIR Issue
	DRAWN BY: MP	PM / CHECKED BY: MR

SCALE @ A3 1:25,000

0 250 500 1,000 m

\\eur-mpfs-02\projects\11055 Gatwick - Genesis\Tech\Drawings\11055-0409-05.mxd



YOUR LONDON AIRPORT Gatwick

KEY

- Project Site Boundary (PEIR)
- 5km Buffer from Site Boundary (approximate study area for LTVIA)
- District Boundaries
- Gatwick Airport Urban Character Area

Crawley District

- Crawley Urban Area (including neighbourhoods)
- Crawley Character Areas

Tandridge District

- Low Weald Farmland
- Wooded High Weald

Reigate and Banstead (Sub-Areas)

- C1 - Low Weald
- Horley Townscape

Mid Sussex District

- LCA6 - High Weald
- LCA7 - High Weald Plateau
- LCA 8 - Worth Forest

Horsham District

- I2 - Warnham & Rusper Wooded Ridge
- K1 - Upper Mole Farmlands
- K2 - Faygate & Warnham Vale
- L1 - St Leonards Forest

Mole Valley District

- 4A - Open Weald
- 4B - Wooded Weald

DOCUMENT

Preliminary Environmental Information Report Non-Technical Summary

DRAWING TITLE

District Landscape and Townscape Character Areas within 5 km Radius

DATE

September 2021

ORIENTATION	DRAWING NO.	REVISION
N	FIGURE 6	For PEIR Issue
	DRAWN BY	PM / CHECKED BY
	CR	PE

SCALE @ A3 1:55,000

0 500 1,000 2,000 m

\\eur-mpfs-02\projects\11055 Gatwick - Genesis\Tech\Drawings\11055-0088-16.mxd

YOUR LONDON AIRPORT Gatwick

KEY

- 5km buffer from Project Site Boundary
- 20km buffer from Project Site Boundary
- Project Site Boundary (PEIR)
- Site of Special Scientific Interest
- Special Protection Area
- Special Area of Conservation
- Local Nature Reserve
- Ancient Woodland
- Country Park

Source:
Natural England

DOCUMENT

Preliminary Environmental Information Report Non-Technical Summary

DRAWING TITLE

Statutory Designated Sites

DATE

September 2021

ORIENTATION	DRAWING NO.	REVISION
N	FIGURE 7	For PEIR Issue
	DRAWN BY: CR/BG	PM / CHECKED BY: NB

SCALE @ A3 1:160,000

0 1,250 2,500 5,000 m

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YOUR LONDON AIRPORT Gatwick

KEY

Project Site Boundary (PEIR)

Main River

Ordinary Watercourses

1% (1 in 100) AEP Event + 35% CC Depth Difference

-0.1 to -10	0 to 0.01 Neutral
-0.05 to -0.1	0.01 to 0.05
-0.01 to -0.05	0.05 to 0.1
0 to -0.01	>= 0.1

Existing Elements

- Existing Buildings
- Existing Stands
- Existing Runways and Taxiways

Project Elements

- Terminals and Pier Works
- Hangar
- Hotel
- Offices
- Stands
- Runway and taxiway
- Relocation of Fire Training Ground
- Noise Mitigation
- Proposed Car Parks
- CARE and MT maintenance facilities

DOCUMENT

Non Technical Summary Report

DRAWING TITLE

Upper Mole Hydraulic Model Depth Difference to BAseline 1% (1 in 100) AEP event +35%cc (With-Project, With-Mitigation)

DATE

September 2021

ORIENTATION	DRAWING NO.	REVISION
N	FIGURE 8	For NTS Issue
	DRAWN BY: CW	PM / CHECKED BY: MS

SCALE @ A3 1:20,000

0 125 250 500 750 1,000 m

\\Uk-lon-fas02\projects\SSBU\GADD001A-Gatwick-EMR\@Projects\GALCTC25-Northern-Runway-Water\500 GIS\Figures\MXDs\FRA_Figures_Template_10_5_updated.mxd

YOUR LONDON AIRPORT Gatwick

KEY

- Project Site Boundary (PEIR)
- Local Study Area
- Labour Market
- Five Authorities Area Boundary

DOCUMENT

Preliminary Environmental Information Report Non-Technical Summary

DRAWING TITLE

Project Boundary, Local Study Area, Labour Market Area and Five Authorities Area

DATE

September 2021

ORIENTATION	DRAWING NO.	REVISION
N	FIGURE 9	For PEIR Issue
	DRAWN BY: MAR	PM / CHECKED BY: CGJ

SCALE @ A3 1:550,000

0 15,000 30,000 m

Numbered unitary areas:
22 POOLE
23 BOURNEMOUTH
24 CITY OF SOUTHAMPTON
25 CITY OF PORTSMOUTH
26 READING
27 WOKINGHAM
28 BRACKNELL FOREST
29 WINDSOR AND MAIDENHEAD
30 SLOUGH

YOUR LONDON AIRPORT Gatwick

KEY

- Project Site Boundary (PEIR)
- Bridleway
- Byway
- Footpath
- Other route
- National Cycle Route 21 (NCR21)

Sussex Border Path - footpath numbers highlighted in yellow form part of this route.

DOCUMENT

Preliminary Environmental Information Report
Non-Technical Summary

DRAWING TITLE

Existing Recreational Facilities

DATE

September 2021

ORIENTATION	DRAWING NO.	REVISION
N	FIGURE 10	For PEIR Issue
	DRAWN BY: CR	PM / CHECKED BY: ES

SCALE @ A3 1:20,000

0 125 250 500 750 1,000 m

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Preliminary Environmental Information Report
Volume 1

September 2021

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Volume 1

Preliminary Environmental Information Report
Chapter 1: Introduction

September 2021

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1 Introduction

1.1 Introduction

1.1.1 This Preliminary Environmental Information Report (PEIR) has been prepared on behalf of Gatwick Airport Limited (GAL). It presents the preliminary findings of the Environmental Impact Assessment (EIA) process for the proposal to make best use of Gatwick Airport's existing runways (referred to within this report as 'the Project'). The Project proposes alterations to the existing northern runway which, together with the lifting of the current planning restrictions on its use, would enable dual runway operations. The Project includes the development of a range of infrastructure and facilities which, with the alterations to the northern runway, would enable the airport passenger numbers and aircraft operations to increase.

1.2 Site Location

1.2.1 Gatwick Airport is located in the county of West Sussex between the towns of Crawley and Horley. The airport's two passenger terminals (North Terminal and South Terminal) are directly served by the M23 motorway spur off the M23, which runs approximately 1.7 km to the east of the airport. The A23 (London Road) also serves the airport, running in a north-south direction through the airport. The airport is located on the London to Brighton mainline railway. Gatwick Airport's railway station is located at the South Terminal, from which there is a direct transit link to the North Terminal.

1.2.2 Gatwick Airport lies within the administrative area of Crawley Borough Council and immediately adjacent to the boundaries of Mole Valley District Council to the north west, Reigate and Banstead Borough Council to the north east and Horsham District Council to the south west. Other neighbouring administrative areas include Tandridge District Council (located approximately 1.9 km to the east of Gatwick Airport) and Mid Sussex District Council (approximately 2 km to the south east).

1.2.3 The site location is shown on Figure 1.2.1, with administrative boundaries illustrated on Figure 1.2.2.

1.3 Overview of the Project

1.3.1 Gatwick Airport is currently served by a single main runway. The airport also has a further runway, which is located north of the main runway and is only available for use when the main runway is closed. This runway is known as the 'northern runway' or the 'standby runway'. A planning condition, together with a planning agreement, has historically prevented this runway from being used at the same time as the main runway. This agreement expired in August 2019 but the planning condition remains in place.

1.3.2 The Project proposes to make alterations to the northern runway, including repositioning its centreline to the north by 12 metres which, along with the lifting of the planning condition restricting its use, would enable dual runway operations in accordance with international standards. These operations would result in:

- all arriving aircraft using the existing main runway during normal operations;

- shared departures between the existing main runway and the northern runway (with smaller aircraft using the northern runway); and
- controlled dependency between the two runways to enable safe operations, including crossing of the northern runway by arriving aircraft[1].

1.3.3 It is anticipated that by 2038 the Project could increase airport throughput to approximately 75.6 million passengers per annum (mppa), compared to a forecast throughput in the absence of the Project of approximately 62.4 mppa within the same timescale. This represents an increase of approximately 13.2 mppa. Further details of predicted passenger growth, including the effects of the Covid pandemic, are provided in Chapter 4: Existing Site and Operation, Chapter 5: Project Description and Appendix 4.3.1: Forecast Data Book.

1.3.4 The Project includes the following key components:

- alterations to the existing northern runway, including repositioning its centreline 12 metres further north to enable dual runway operations;
- reconfiguration of existing and provision of new taxiways;
- pier and stand amendments (including a proposed new pier);
- reconfiguration of other airfield facilities;
- extensions to the North and South Terminals;
- provision of additional hotel and office space;
- provision of reconfigured car parking, including new surface and multi-storey car parks;
- surface access (highway) improvements;
- reconfiguration of existing utilities, including surface water, foul drainage and power; and
- landscape/ecological planting and environmental mitigation.

1.3.5 The land that forms the subject of this PEIR extends to approximately 820 hectares, of which approximately 747 hectares lies within the ownership of GAL. The Project site boundary is shown on Figure 1.3.1. Further details of the existing airport operation are provided in Chapter 4 of this PEIR, while a description of the Project is provided in Chapter 5.

1.4 Consenting Regime and Requirement for Environmental Assessment

Consenting Regime

1.4.1 The Planning Act 2008, as amended, defines Nationally Significant Infrastructure Projects (NSIPs). Alterations to existing airports in England fall under the Planning Act 2008, as amended, where the alteration would:

- increase by at least 10 million per year the number of passengers for whom the airport is capable of providing air passenger transport services; or
- increase by at least 10,000 per year the number of air transport movements of cargo aircraft for which the airport is capable of providing air cargo transport services.

1.4.2 'Alteration' in relation to airports for the purposes of the Planning Act 2008 includes construction, extension or alteration of a runway, buildings, radar/radio mast/antenna or other apparatus at the airport.

[1] Controlled dependency: to ensure the safety of aircraft operations, an arrival from the main runway would slow or stop short of the northern runway and cross it only after a departure on the northern runway has completed.

1.4.3 The Project would fall within the definition of an alteration to Gatwick Airport and would meet the threshold for change in the number of passengers and would therefore represent an airport NSIP.

1.4.4 Alterations to existing highways also fall the Planning Act 2008, as amended, where the affected highways fall entirely within England, where the Secretary of State or strategic highways company will be the highway authority for the highway and where the area exceeds the stated threshold. The applicable thresholds are:

- for the alteration of a motorway, 15 hectares.
- for the alteration of a highway, other than a motorway, where the speed limit is expected to be equal to or greater than 50 mph, 12.5 hectares.
- for the construction or alteration of any other highway, 7.5 hectares.

1.4.5 The proposed improvements to the North Terminal and South Terminal roundabouts would each individually involve the alteration of a highway where the speed limit is 50 mph or over. The highway works individually each exceed the 12.5 hectare limit that applies to this category of road. Therefore, the Project includes works that constitute a highways NSIP in their own right.

1.4.6 Applications for development consent for NSIPs are examined by the Planning Inspectorate and determined by the Secretary of State.

1.4.7 The Planning Act defines the key stages in the application process for NSIPs. These are summarised in Diagram 1.4.1. The Project is currently at this pre-application stage.

Need for EIA

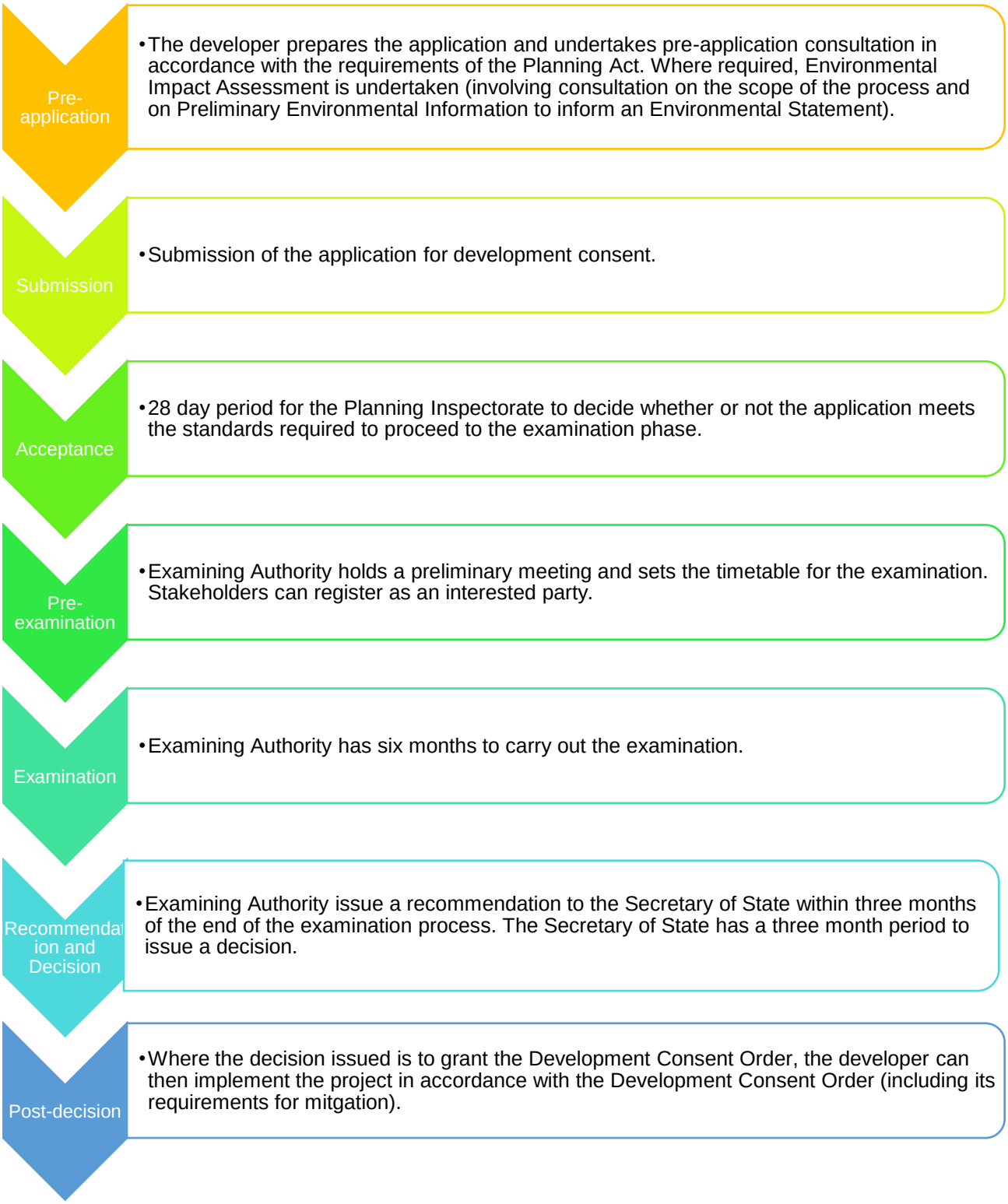
1.4.8 EIA is the process of identifying and assessing the significant effects likely to arise from a project. This requires consideration of the likely changes to the environment, where these arise as a consequence of a project, through comparison with the existing and projected future baseline conditions.

1.4.9 For NSIPs in England, the legislative requirements for EIA are set by The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017, as amended (referred to in this report as the EIA Regulations).

1.4.10 EIA is not required for all developments. Schedule 1 of the EIA Regulations identifies development types that always require EIA. Schedule 2 identifies development types that require EIA if they are likely to lead to significant effects on the environment by virtue of factors such as their nature, size or location.

1.4.11 The Project would fall under Schedule 2, Part 13 (1) relating to changes or extensions to existing developments listed in Schedule 1. Such developments comprise Schedule 2 development where the change or extension may have significant adverse effects on the environment. Taking into account the nature and scale of the development proposed, EIA is being undertaken for the Project.

Diagram 1.4.1: Overview of Application Process



Additional Assessments

1.4.12 In addition to the Planning Act and the EIA Regulations, other environmental legislation applicable to the Project requires specific assessments to be undertaken. The approach to addressing this legislation within this PEIR is set out below.

1.4.13 The effect of the Project on designated sites is being assessed, taking into account the requirements of the Conservation of Habitats and Species Regulations 2017. A report setting out the findings of the assessment process will be prepared following the method set out in the Planning Inspectorate Advice Note Ten: Habitats Regulations Assessment Relevant to Nationally Significant Infrastructure Projects (Planning Inspectorate, 2017). The preliminary findings to date are set out in Appendix 9.9.1 of this PEIR.

1.4.14 The effect of the Project in relation to The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 and the effect on environmental objectives for surface and groundwater bodies is considered within Appendix 11.9.2 of this PEIR.

1.5 Purpose of this Report

1.5.1 This PEIR presents the preliminary findings of the EIA process in accordance with Regulation 12 of the EIA Regulations. Regulation 12 requires an applicant to compile 'preliminary environmental information' that allows:

'consultation bodies to develop an informed view of the likely significant environmental effects of the development (and of any associated development)'.

1.5.2 This report provides details of the Project, together with an overview of the alternatives considered to date. For each environmental topic, details of the approach to assessment, the existing and likely future environmental conditions and the preliminary findings regarding the likely significant effects of the Project are set out, based on the information available at this time. Initial details of the measures proposed to avoid, prevent, reduce or offset significant adverse effects (known as mitigation measures) are also provided.

1.5.3 The EIA process is currently ongoing, with further work being carried out to enhance the understanding of existing environmental conditions and to provide further detail of the likely significant environmental effects. Feedback provided during the consultation process will be taken into account in refining the design of the Project, during the ongoing assessment work and during the development of further mitigation measures where necessary. The results of this further work will be set out within the Environmental Statement (ES) that will accompany the application for development consent.

1.6 Structure of the PEIR

1.6.1 This PEIR has been structured in order to allow relevant environmental information to be easily accessible, as shown in Table 1.6.1.

Table 1.6.1: Structure of the PEIR

Volume / Chapter	Topic
Non-Technical Summary: Summary of the PEIR using non-technical terminology	
Volume 1, Chapter 1	Introduction
Volume 1, Chapter 2	Planning Policy Context
Volume 1, Chapter 3	Need and Alternatives Considered
Volume 1, Chapter 4	Existing Site and Operation
Volume 1, Chapter 5	Project Description
Volume 1, Chapter 6	Approach to Environmental Assessment
Volume 1, Chapter 7	Historic Environment
Volume 1, Chapter 8	Landscape, Townscape and Visual Resources
Volume 1, Chapter 9	Ecology and Nature Conservation
Volume 1, Chapter 10	Geology and Ground Conditions
Volume 1, Chapter 11	Water Environment
Volume 1, Chapter 12	Traffic and Transport
Volume 1, Chapter 13	Air Quality
Volume 1, Chapter 14	Noise and Vibration
Volume 1, Chapter 15	Climate Change and Carbon
Volume 1, Chapter 16	Socio-economic Effects
Volume 1, Chapter 17	Health and Wellbeing
Volume 1, Chapter 18	Agricultural Land Use and Recreation
Volume 1, Chapter 19	Cumulative Effects and Inter-relationships
Volume 1, Chapter 20	Summary of Effects
Volume 2: Figures	
Volume 3: Appendices	

1.6.2 This volume of the PEIR (Volume 1) provides the main text of the PEIR. Chapter 2 sets out details of the planning policy context for the Project, while information relating to the main alternatives considered during the evolution of the Project and the reasons for the choices made is found within Chapter 3.

1.6.3 The description of the existing airport is provided in Chapter 4, with details of the Project assessed within this PEIR set out in Chapter 5. Chapter 6 sets out the approach and methodology adopted for the EIA process.

1.6.4 The remainder of Volume 1 contains topic-by-topic environmental information as shown in Table 1.6.1. Chapter 19 sets out the consideration of inter-relationships between topics and potential cumulative effects with other developments. A summary of effects is provided in Chapter 20.

1.6.5 Figures and appendices to accompany the text are provided separately in Volumes 2 and 3. Volume 3 includes specialist reports providing relevant background and technical information. A Non-Technical Summary (NTS) of the PEIR is available as a separate summary document.

1.7 The Applicant

1.7.1 GAL is the company licensed to operate Gatwick Airport by the Civil Aviation Authority (CAA)[2]. Gatwick Airport is majority owned by VINCI Airports, with the remainder owned by a consortium of investors managed by Global Infrastructure Partners (GIP).

1.8 The Assessment Team

1.8.1 The team responsible for the production of this PEIR has been led by GAL, supported by lead EIA consultant RPS. RPS is a registrant of the Institute of Environmental Management and Assessment (IEMA) Quality Mark. Table 1.8.1 sets out details of the consultant team.

Table 1.8.1: Consultant Team

Topic	Consultant
EIA coordination and planning	RPS
Project design and buildability	GAL
Historic environment	RPS
Landscape, townscape and visual resources	RPS
Ecology and nature conservation	RPS
Geology and ground conditions	RPS
Water environment	Jacobs
Traffic and transport	Arup
Air quality	Arup (supported by Ricardo)
Noise and vibration	Mitchell Environmental Ltd (supported by Hayes McKenzie)
Climate change and carbon	Arup
Socio-economic effects	Lichfields (supported by Oxera)
Health and wellbeing	RPS/Savills
Agricultural land use and recreation	RPS
Major accidents and disasters	Atkins
Waste	RPS
Cumulative effects and inter-relationships	Assessment team

1.8.2 A statement setting out the relevant expertise of each of the topic authors is provided in Appendix 1.8.1.

1.9 Next Steps

1.9.1 The PEIR has been prepared to provide the basis for formal consultation under the Planning Act 2008, as amended. This builds on the consultation undertaken to date, including consultation in relation to the scope of the EIA process (see Chapter 6: Environmental Assessment Methodology for further details).

[2] GAL is the company holding the European Union Aviation Safety Agency (EASA) Aerodrome Certificate issued by the CAA.

1.9.2 The Project website will include all consultation documents, together with a virtual exhibition and details of document deposit points and mobile project office locations. In addition, the consultation process will include:

- provision of consultation documents (including the PEIR) on the Project website and on USB drives;
- provision of hard copies of the documents at deposit points (libraries, local authority offices and other public locations) within each host or neighbouring local authority;
- provision of individual hard copies of the documents on request;
- telephone surgeries for members of the public – to be booked through the Project website, by email, at a mobile project office or by calling the Project hotline;
- use of a mobile Project office to provide copies of documents and assist those who require assistance to book a telephone surgery appointment online;
- virtual presentations and events for stakeholder groups on request;
- use of a newsletter to publicise the consultation and details of howe to access consultation documents;
- use of social media to publicise the consultation and encourage feedback; and
- consultation hotline and email address.

1.9.3 Document deposit points are set out in Table 1.9.1.

1.9.4 Copies of the PEIR can be requested by post from:

FREEPOSTRTRB-LUUJ-AGBY

1.9.5 Or through the Project website, by phone or by email at:

- www.gatwickairport.com/futureplans;
- feedback@gatwickfutureplans.com; or
- 0800 038 3486 during normal business hours (Monday to Friday, 9am to 5.30pm).

1.9.6 A charge will be made for paper copies.

1.9.7 Details of how members of the public may respond to the consultation are set out in the Consultation Overview document.

1.9.8 The consultation process to date and ongoing consultation will continue to influence the Project design. The next stage, following completion of consultation and analysis of the consultation responses, is to make an application for development consent, addressing the consultation responses received, where appropriate.

1.9.9 Following consultation, an ES will be prepared. The ES will accompany the application for development consent and will take into account the comments received during consultation with the community, statutory consultation bodies and other interested parties.

1.9.10 Details of the consultation undertaken during the preparation of the application will be set out in a separate Consultation Report. This report will demonstrate how the comments received during consultation with the community, statutory consultation bodies and other interested parties have been considered and addressed. The Consultation Report will be submitted alongside the final ES at the time of application.

Table 1.9.1: Consultation Document Deposit Points

DEPOSIT LOCATIONS	OPENING TIMES *(correct at time of publication)* MON	TUE	WED	THU	FRI	SAT	SUN
Crowborough Community Centre, Pine Grove, Crowborough, TN6 1FE	8am - 1pm						⊗
Uckfield Library, Library Way, High Street, Uckfield, TN22 1AR	10am - 1pm	10am - 4.30pm	2pm - 4.30pm	10am - 6pm	10am - 4.30pm		⊗
Tunbridge Wells Library, Level 1, Royal Victoria Place Shopping Centre, Tunbridge Wells TN1 2SS	9am - 6pm					9am - 5pm	10.30am - 4pm
Edenbridge Library, The Eden Centre, Four Elms Road, Edenbridge, TN8 6BY	9am - 1pm	9am - 5pm			1pm - 5pm	10am - 3pm	⊗
Dorking Library, St Martin's Walk, Dorking, RH4 1UT	9.30am - 5.30pm					9.30am - 5pm	⊗
Leatherhead Library, The Mansion, 68 Church Street, Leatherhead, KT22 8DP	⊗	9.30am - 5pm					⊗
Reigate and Banstead Town Hall, Castlefield Road, Reigate, Surrey, RH2 0SH	8.45am - 5pm				8.45am - 4.45pm	⊗	⊗
Horley Library, 55-57 Russell Square, Victoria Road, Horley, RH6 7QH	⊗	9.30am - 5pm					⊗
Oxted Library, 12 Gresham Road, Oxted, RH8 0BQ	⊗	9.30am - 5pm					⊗
Caterham Valley Library, Stafford Road, Caterham, Surrey, CR3 6JG	⊗	9.30am - 5pm					⊗
Crawley Library, Southgate Avenue, Crawley, RH10 6HG	9am - 6pm					9am - 5pm	⊗
Broadfield Library, 46 Broadfield Place, Crawley, RH11 9BA	10am - 5pm					10am - 2pm	⊗
Horsham Library, Lower Tanbridge Way, Horsham, RH12 1PJ	9am - 6pm					9am - 5pm	⊗
Billingshurst Library, Mill Lane, Billingshurst, RH14 9JZ	10am - 5pm					10am - 2pm	⊗
Mid Sussex District Council, Oaklands, Oaklands Road, Haywards Heath, RH16 1SS	8.45am - 5.15pm				8.45am - 4.15pm	⊗	⊗
East Grinstead Library, 32 - 40 West Street, East Grinstead, RH19 4SR	9.30am - 6pm					9.30am - 5pm	⊗
Jubilee Library, Jubilee Street, Brighton, BN1 1GE	10am - 5pm						11am - 5pm
Westdene Library, 24 Bankside, Brighton, BN1 5GN	9am – 5pm					9.30am - 5pm	11am - 5pm

1.10 References

The Infrastructure Planning (Environmental Impact Assessment) Regulations, 2017. 2017 No. 572.

The Town and Country Planning and Infrastructure Planning (Environmental Impact Assessment) (Amendment) Regulations 2018. 2018 No. 695.

1.11 Glossary

Table 1.11.1: Glossary of Terms

Term	Description
CAA	Civil Aviation Authority
EASA	European Union Aviation Safety Agency
EIA	Environmental Impact Assessment
ES	Environmental Statement
GAL	Gatwick Airport Limited
GIP	Global Infrastructure Partners
IEMA	Institute of Environmental Management and Assessment
mppa	Million passengers per annum
NSIP	Nationally Significant Infrastructure Project
NTS	Non-Technical Summary
PEIR	Preliminary Environmental Information Report
SoCC	Statement of Community Consultation

Preliminary Environmental Information Report
Chapter 2: Planning Policy Context

September 2021

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2 Planning Policy Context

2.1 Introduction

2.1.1 This chapter sets out an overview of the relevant planning policy context against which the application for development consent will be determined.

2.2 Planning Policy

2.2.1 This section summarises the key planning policy documents that will inform the EIA process. Further detail on these policy documents is presented in Appendix 2.2.1. Each topic chapter of this PEIR sets out the policy relevant to that topic.

Airports National Policy Statement

2.2.2 The Planning Act 2008 requires that in deciding applications for development consent, regard must be had to any National Policy Statement (NPS) which has 'effect' in relation to development of the description to which the application relates (a 'relevant national policy statement').

2.2.3 On 26th June 2018, the Government designated the Airports NPS (Department for Transport, 2018a). The NPS only has 'effect' in relation to the delivery of additional airport capacity through the provision of the Heathrow Northwest Runway project, including new terminal capacity between the new runway and the existing northern runway at Heathrow Airport, as well as the reconfiguration of terminal facilities in the area between the two existing runways at Heathrow Airport (paragraph 1.40). Paragraph 1.41 of the NPS makes it clear that it does not have 'effect' in relation to an application for development consent for airport development that does not comprise an application relating to the Heathrow Northwest Runway

2.2.4 Nevertheless, paragraph 1.14 of the Airports NPS confirms that the NPS sets out planning policy in relation to applications for any airport Nationally Significant Infrastructure Project in the South East of England, and that its policies will be '*important and relevant'* for the examination by the Examining Authority, and decisions by the Secretary of State in relation to such applications. Paragraph 1.12 of the Airports NPS also states, in this respect, that the NPS '*will be an important and relevant consideration in respect of applications for new runway capacity and other airport infrastructure in London and the South East of England*.'

2.2.5 The use of the phrase 'important and relevant' confirms that the Airports NPS is only indirectly relevant to the Gatwick Northern Runway Project. Whilst it is still a relevant consideration, it will not form the basis for determination of the application for development consent.

2.2.6 Paragraph 1.38 of the Airports NPS confirms that other Government policy on airport capacity has been set out in the Aviation Policy Framework published in 2013 and that the Airports NPS does not affect wider aviation issues '*for which the 2013 Aviation Policy Framework and any subsequent policy statements still apply*'.

2.2.7 On 27 February 2020, a ruling in the Court of Appeal successfully challenged the designation of the Airports NPS. This was subsequently overturned by the Supreme Court on 16 December 2020. The Airports NPS therefore remains effective. Although the Airports NPS does not 'have effect' in relation to applications for development consent for airport developments that do not

relate to the Heathrow Northwest Runway, it does set out support for other airports in the south east of England to make best use of existing runways.

2.2.8 Paragraph 1.39 of the NPS states that:

'… the Government has confirmed that it is supportive of airports beyond Heathrow making best use of their existing runways. However, we recognise that the development of airports can have positive and negative impacts, including on noise levels. We consider that any proposals should be judged on their individual merits ... taking careful account of all relevant considerations, particularly economic and environmental impacts.' (paragraph 1.39)

2.2.9 While paragraph 1.42 of the NPS states that:

'… airports wishing to make more intensive use of existing runways will still need to submit an application for planning permission or development consent to the relevant authority, which should be judged on the application's individual merits. However, in light of the findings of the Airports Commission on the need for more intensive use of existing infrastructure as described at paragraph 1.6 above, the Government accepts that it may well be possible for existing airports to demonstrate sufficient need for their proposals, additional to (or different from) the need which is met by the provision of a Northwest Runway at Heathrow. As indicated in paragraph 1.39 above, the Government's policy on this issue will continue to be considered in the context of developing a new Aviation Strategy.' (paragraph 1.42)

2.2.10 Paragraph 4.4 of the Airports NPS provides further detail of the considerations for weighing adverse impacts against benefits for any airport development:

'In considering any proposed development, and in particular when weighing its adverse impacts against its benefits, the Examining Authority and the Secretary of State will take into account:

- *Its potential benefits, including the facilitation of economic development (including job creation) and environmental improvement, and any long term or wider benefits; and*
- *Its potential adverse impacts (including any longer term and cumulative adverse impacts) as well as any measures to avoid, reduce or compensate for any adverse impacts*.'

2.2.11 Other Government policy on airport capacity is set out in the Aviation Policy Framework, published in 2013 (see below). The Airports NPS makes clear that its designation does not affect Government policy on wider aviation issues, for which the Aviation Policy Framework and any subsequent policy statements still apply.

2.2.12 The Government's policy framework for airports (other than Heathrow), which sets out the Government's support for making best use of existing airports and their capacity, is set out below.

Aviation Policy Framework

2.2.13 In 2011, the Government commenced the process of preparing a new policy framework for UK aviation to replace the 2003 Future of Air Transport White Paper (Department of Transport, 2003) – a national aviation policy which had set out a strategic framework for the development of airport

capacity, supporting the development of new runways at Heathrow and Stansted, and making the best use of other existing airport capacity.

2.2.14 This led to a draft Aviation Policy Framework being published in July 2012 and the final Aviation Policy Framework in March 2013 (Department for Transport, 2013). The Aviation Policy Framework sets out the Government's objectives and principles to guide plans and decisions on airport development at the local and regional level. As the Airports NPS does not take 'effect', and until up-to-date Government policy on airports is published, then the most up to date policy framework is set out in the Aviation Policy Framework.

2.2.15 The Aviation Policy Framework recognises that the aviation sector contributes significantly to the UK economy. However, it also notes that airports in the south east of England (including Heathrow and Gatwick) face capacity challenges. The Aviation Policy Framework identifies a number of other challenges in the aviation sector, noting that aviation needs to grow, delivering benefits essential to economic wellbeing, while respecting the environment and protecting quality of life.

2.2.16 The Aviation Policy Framework confirms the Government's support for making best use of existing airport capacity to improve performance, resilience and passenger experience in the short term.

Beyond the Horizon – The Future of UK Aviation: Making Best Use of Existing Runways

2.2.17 In late 2012, during the preparation of the Aviation Policy Framework, the Government set up the Airports Commission. Included within the Airports Commission's brief was the requirement to examine the nature, scale and timing of any requirements for additional airport capacity to allow the UK to maintain its position as Europe's most important aviation hub.

2.2.18 The Government is currently in the process of preparing an updated national Aviation Strategy, which will replace the 2013 Aviation Policy Framework and respond to the Airports Commission's recommendation for other airports to make more intensive utilisation of their existing infrastructure. Whilst this revised strategy is still under preparation, the Government in its policy statement 'Beyond the Horizon - The Future of UK Aviation: Making Best Use of Existing Runways' (HM Government, 2018a) reaffirmed its policy support for airports making best use of their existing runways:

'…the Government is supportive of airports beyond Heathrow making best use of their existing runways. However, we recognise that the development of airports can have negative as well as positive local impacts, including on noise levels. We therefore consider that any proposals should be judged by the relevant planning authority, taking careful account of all relevant considerations, particularly economic and environmental impacts and proposed mitigations.' (paragraph 1.29)

Other Relevant Policy

2.2.19 In addition to the above, the following documents provide airports policy relevant to the Project and have been considered, where appropriate, within the EIA process:

- Beyond the Horizon: The Future of UK Aviation. Next Steps Towards an Aviation Strategy (HM Government, 2018b);
- Aviation Strategy Green Paper: Aviation 2050 – The Future of UK Aviation (Department for Transport, 2018b); and
- The National Infrastructure Delivery Plan: 2016 2021 (Infrastructure and Projects Authority, 2016).

2.2.20 These documents confirm the Government's policy support for making best use of existing runway capacity at airports beyond Heathrow. The principle of making best use of existing airport capacity has therefore been a long standing and consistent feature of UK aviation policy since 2003 and remains so today. Further details are provided in Chapter 3: Need and Alternatives Considered.

National Policy Statement for National Networks

2.2.21 While the primary purpose of the Project is airport-related development, highways improvements are proposed in order to facilitate the increased passenger throughput (specifically improvements to the North Terminal and South Terminal roundabouts). These highways works meet the threshold for a highways NSIP in their own right. Therefore, the NPS for National Networks (Department for Transport, 2015) is a relevant consideration for the Project[1].

2.2.22 The NPS for National Networks sets out the need for development of road, rail and strategic rail freight interchange projects on the national networks and the policy against which decisions on major road and rail projects will be made.

National Planning Policy Framework

2.2.23 The National Planning Policy Framework (NPPF) was published in 2012 and updated in 2018, 2019 and 2021 (Ministry of Housing, Communities and Local Government, 2021a). In addition, in January 2021 the Government consulted on a selective review of the NPPF and published a draft Model Design Code (Ministry of Housing, Communities and Local Government, 2021b) to implement policy changes in response to the 'Living with Beauty' report (Building Better, Building Beautiful Commission, 2020).

2.2.24 The NPPF sets out the Government's planning policies for England and how these are to be applied in relation to the determination of planning applications made under the Town and Country Planning Act 1990 (as amended). The NPPF states that planning law requires planning applications to be determined in accordance with the Development Plan for the relevant area unless material considerations indicate otherwise. Paragraph 2 states the NPPF '*… is a material consideration in planning decisions*'.

2.2.25 Paragraph 5 states that the NPPF does not contain specific policies for NSIPs. These are to be determined in accordance with the decision-making framework set out in the Planning Act and relevant NPSs for nationally significant infrastructure, as well as any other matters that are considered both important and relevant (which may include the NPPF).

[1] It is noted that the Transport Decarbonisation Plan published by Department for Transport (DfT) on 14 July 2021 announced DfT's intention to review the NPS for National Networks in due course once demand patterns post-pandemic become clearer. It is understood DfT intends to commence the review by the end of 2021 and complete it by Spring 2023. In the interim and whilst the review is undertaken, DfT has confirmed the NPS for National Networks remains relevant government policy and has full force and effect for the purposes of the Planning Act 2008.

National Planning Practice Guidance

2.2.26 On 6 March 2014, the then Department for Communities and Local Government (DCLG) (now Ministry of Housing, Communities and Local Government, MHCLG) launched the planning practice guidance web-based resource to support the NPPF. The National Planning Practice Guidance (NPPG) provides guidance across a range of topic areas, including in relation to environmental topic areas relevant to the EIA process.

Local Planning Policy

2.2.27 The Planning Act 2008, as amended, does not incorporate Section 38(6) of the Planning and Compulsory Purchase Act 2004, which provides the principal basis in legislation for the determination of planning applications under the Town and Country Planning Act 1990, namely that they must be determined in accordance with the statutory development plan unless material considerations indicate otherwise. Applications for development consent made under the Planning Act are determined as set out above. The local development plan is not therefore the starting point for the consideration of an application for development consent. Nevertheless, local policy has been considered through the EIA process where relevant.

2.2.28 Table 2.2.1 outlines the key local planning policy documents that are under consideration during the EIA process. Where relevant, emerging policy documents are also listed.

Table 2.2.1: Key Local Planning Policy

Authority	Adopted Policy	Emerging Policy
West Sussex County Council	West Sussex Local Transport Plan 2011-2026 (LTP3) (2011) West Sussex Joint Minerals Local Plan (2021) West Sussex Waste Local Plan (2014)	West Sussex Transport Plan 2022 to 2036: Draft for Consultation (2021)
Surrey County Council	Surrey Local Transport Plan 2011-2026 (LTP3) (2011a, updated 2017) Surrey Minerals Plan Core Strategy (2011b) Surrey Minerals Plan Primary Aggregates Development Plan Document (2011c) Surrey Aggregates Recycling Joint Development Plan Document (2013) Surrey Waste Local Plan 2019-2033 (2020)	Surrey Local Transport Plan 2022-2032 (LTP4) (2021)
Crawley Borough Council	Crawley 2030: Crawley Borough Local Plan 2015-2030 (2015)	Draft Crawley Borough Local Plan 2021-2037 (2021)
Reigate and Banstead Borough Council	Reigate and Banstead Local Plan: Core Strategy (2014) Reigate and Banstead Local Plan Development Management Plan (2019)	N/A
Tandridge District Council	Tandridge District Core Strategy (2008). Tandridge Local Plan Part 2: Detailed Policies 2014-2029 (2014)	Our Local Plan: 2033 (Regulation 22 Submission) (2019)

Authority	Adopted Policy	Emerging Policy
Mid Sussex District Council	Mid Sussex District Plan 2014-2031 (2018) Saved Policies from the Mid Sussex Local Plan 2004 (2004)	Site Allocations Development Plan Document: Draft Submission (2020)
Horsham District Council	Horsham District Planning Framework (Horsham District Council, 2015) Site Specific Allocations of Land (2007)	Draft Horsham District Local Plan 2019-2036 (2020)
Mole Valley District Council	Mole Valley Core Strategy (2009) Mole Valley Local Plan (2000)	Future Mole Valley 2018-2033: Consultation Draft Local Plan (2020)

2.2.29 In addition, relevant supplementary planning documents have also been considered where they are relevant and important. Where study areas for individual topics extend beyond the above administrative areas, planning documents relevant to additional administrative areas within the study areas have been taken into account.

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Legislation

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The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009. 2009 No. 2264.

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2.4 Glossary/Abbreviations

Term	Description
CAA	Civil Aviation Authority
DCLG	Department for Communities and Local Government
EIA	Environmental Impact Assessment
ES	Environmental Statement
GAL	Gatwick Airport Limited
MHCLG	Ministry of Housing, Communities and Local Government
NPPF	National Planning Policy Framework
NPPG	National Planning Practice Guidance
NPS	National Policy Statement
NSIP	Nationally Significant Infrastructure Project
PEIR	Preliminary Environmental Information Report

Preliminary Environmental Information Report
Chapter 3: Need and Alternatives Considered

September 2021

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3 Need and Alternatives Considered

3.1. Introduction

3.1.1 This chapter of the Preliminary Environmental Information Report (PEIR) provides a summary of the need for the Project and the main alternatives considered by Gatwick Airport Limited (GAL) during the early optioneering and Project design process. It includes a summary of the reasons for the design evolution with a description of the main alternative design and layout options that have been considered.

3.2. Need for the Project

3.2.1 In recent months the aviation industry has been particularly affected by the Covid-19 pandemic and, over the years, has also been a focus of attention in the urgent need to address climate change. Whilst both issues are of global importance, neither affect the underlying case for continued investment in infrastructure to preserve and enhance international connectivity.

3.2.2 The Covid-19 pandemic had a devastating impact on the global aviation industry in 2020. Gatwick, along with all other UK airports, experienced a significant reduction in passenger traffic levels as a result of both Government imposed restrictions on air travel and reduced passenger demand, driven by low consumer confidence. UK passenger volumes in 2020 were 78% down on volumes for 2019. It is expected that Government travel restrictions will continue to have an impact on passenger demand and traffic levels throughout 2021, but that by the end of 2021 traffic levels will start to recover.

3.2.3 While the immediate outlook therefore remains challenging, there is confidence across the aviation industry that passenger and airline demand at Gatwick will return to previous levels over the course of the next few years and then continue to grow thereafter.

3.2.4 Overall, updated forecasts predict that it will take approximately four to five years for passenger traffic at Gatwick to return to levels seen in 2019 and that, by the end of the 2020s, passenger levels at Gatwick will have returned broadly to where they would have been had the pandemic not occurred. This reflects the inherent strength of demand for air travel generally, but particularly at Gatwick, and the constraints on airport capacity in London and the south-east.

3.2.5 Government policy has consistently recognised the importance of aviation. The most recent expression of policy is set out in the Transport Decarbonisation Plan, published in July 2021 (Department for Transport, 2021a), in which the Government explains that:

"*International connectivity is a vital part of Global Britain and everyone should continue to have access to affordable flights, allowing them to go on holiday, visit family and do business*."

3.2.6 At the same time, the Government published '*Jet Zero Consultation, A consultation on our strategy for net zero aviation'* (Department for Transport, 2021b), which explains the Government's absolute commitment to decarbonise the aviation sector whilst continuing to benefit from the connectivity, jobs and economic benefits it provides. The aim of the strategy is for aviation "*to decarbonise in a way that preserves the benefits of air travel and delivers clean growth of the UK sector by maximising the opportunities that decarbonisation can bring*".

3.2.7 These publications bring the aviation debate up to date and they also explicitly confirm that the Government remains committed to support and enhance the aviation sector as a key component of the UK economy in view of the critical contribution it makes. In doing so, the Government has confirmed that its existing planning polices for aviation continue to have "*full effect*". [1]

3.2.8 Those policies include a commitment to growth to respond to forecast increases in demand and to strengthen the aviation sector and the contribution it makes to a number of Government policy objectives. Whilst future levels of growth are necessarily uncertain, as explained further below, there is a particular case to add capacity at Gatwick Airport.

3.2.9 This chapter sets out the context of forecast demand generally before considering the specific case for expansion at Gatwick.

UK Aviation Demand

3.2.10 Government policy on airports and aviation over the years has consistently recognised that aviation has long been at the heart of the UK's economic success. In 2019, the UK had the largest aviation network in Europe and the third largest in the world. Prior to the Covid-19 pandemic, the UK's aviation industry contributed at least £22 billion per annum to the UK economy, along with over 230,000 jobs (Department for Transport, 2018a). Pre-pandemic, aviation was also growing at a rapid rate to meet rising demand with passenger numbers having increased for seven consecutive years.

3.2.11 The need for increased capacity in the sector is well established. In September 2012, the Coalition Government established the Independent Airports Commission to examine the scale and timing of any requirement for additional capacity to maintain the UK's position as Europe's most important aviation hub, and identify and evaluate how any need for additional capacity should be met in the short, medium and long term.

3.2.12 The work of the Airports Commission informed the development of aviation planning policy, the details of which are examined in Chapter 2: Planning Policy Context. In particular, the Government designated the Airports National Policy Statement (NPS) in 2018 (Department for Transport, 2018b). The Airports NPS explained the importance of the aviation sector to the UK economy, as follows:

"International connectivity, underpinned by strong airports and airlines, is important to the success of the UK economy. It is essential to allow domestic and foreign companies to access existing and new markets, and to help deliver trade and investment, linking us to valuable international markets and ensuring that the UK is open for business. It facilitates trade in goods and services, enables the movement of workers and tourists, and drives business innovation and investment, being particularly important for many of the fastest growing sectors of the economy."

3.2.13 The Airports NPS is clear on the need for new airport capacity in the south east and paragraph 2.12 states that:

"Aviation demand is likely to increase significantly between now and 2050. All major airports in the South East of England are expected to be full by the mid-2030s, with four

[1] Jet Zero Consultation page 51.

out of five full by the mid-2020s. By 2050 demand at these airports is expected to outstrip capacity by at least 34%, even on the department's low demand forecast. There is relatively little scope to redistribute demand away from the region to less heavily utilised capacity elsewhere in the country."

3.2.14 The Airports NPS recognises that the UK's hub status is already being challenged by restricted connectivity, whilst airports in Europe have spare capacity. Paragraphs 2.14 -2.16 of the NPS state that:

"The consequences of not increasing airport capacity in the South East of England –the 'do nothing' or 'do minimum scenarios' – are detrimental to the UK economy and the UK's hub status. International connectivity will be restricted as capacity restrictions mean airlines prioritise their routes, seeking to maximise their profits. Capacity constraints therefore lead to trade-offs in destinations, and while there is scope to respond to changing demand patterns, this necessarily comes at the expense of other connections. Domestic connectivity into the largest London airports will also decline as competition for slots encourages airlines to prioritise more profitable routes.

Operating existing capacity at its limits means there will be little resilience to unforeseen disruptions, leading to delays. Fares are likely to rise as demand outstrips supply, and the lack of available slots makes it more difficult for new competitors to enter the market.

The Government believes that not increasing capacity will impose costs on passengers and on the wider economy."

3.2.15 The policy position is more fully explained in Chapter 2: Planning Policy Context, which sets out the Government's consistent policy support for more airport capacity in the south east through both the construction of a third runway at Heathrow, and the need to make best use of infrastructure at other airports.

3.2.16 The UK airports handled a record 300 million passengers in 2019, of which the London airports accounted for 181 million or 60% of the total activity. Demand in the London system has been subject to strong growth, with over 34 million passengers added in the five-year period to 2019.

3.2.17 The latest demand forecasts from the Department for Transport (2017) predicted continued growth in demand of around 1.7% per annum in the long term (2016-2050). This period was forecast to see demand increase by an additional 230 million passengers across the UK's airports.

3.2.18 Recent short-term performance pre-Covid-19 has already outperformed the Department for Transport's projection. Annual growth rates between 2016 and 2019 were stronger than forecast (3.4%), resulting in demand already being at least one year ahead of the Department for Transport's central case forecast.

3.2.19 It is widely recognised that airports in London and the South East of England are increasingly facing longer term capacity issues and, even with a third runway at Heathrow being considered, the Department for Transport forecasts show that demand will outstrip capacity in the London airports system by the mid-2030s.

3.2.20 The forecasts observe that Heathrow and Gatwick are already 'full', whilst Luton is operating close to its planning limit. By 2030, an additional 50 million+ passengers are forecast in the London market - far in excess of today's available capacity, indicating significant need for capacity development.

3.2.21 Further details of forecast growth are set out in the Forecast Data Book at Appendix 4.3.1, however the summary above sets the context within which the specific need for expansion at Gatwick should be considered.

Growth at Gatwick Airport

3.2.22 Despite peak capacity constraints, Gatwick has seen significant levels of growth in the recent years, prior to the Covid-19 pandemic. Over the last decade Gatwick has grown by over 14 million passengers, reaching 46.6 million in the most recent full year of operations (2019). This represents a 44% growth in passengers since 2009, resulting from 15% growth in air traffic movements combined with the use of larger and fuller aircraft.

3.2.23 During this period, domestic volumes remained relatively flat, whilst over 10 million and 4 million passengers were added in the short haul and long haul market categories respectively. The growth in short haul markets has been driven by the continued expansion of low cost carriers, who account for a significant share of growth in the European aviation market. Long haul growth has been driven by many new intercontinental destinations being added by a range of carriers as Gatwick continues to expand its long haul connectivity.

3.2.24 Growth at Gatwick has consistently outstripped Department for Transport forecasts. In 2013, the Department for Transport forecast that Gatwick would accommodate 34 million passengers by 2017, whereas over 40 million passengers were actually handled in that year. The Department for Transport's updated 2017 forecast continues to underestimate passenger demand at Gatwick, suggesting 45 million passengers would be reached by 2030 – a figure which was exceeded in 2017/18.

Future Growth Forecasts

3.2.25 During 2019, Gatwick Airport accommodated the following:

- total passengers: 46.6 million;
- commercial air traffic movements: 283,000; and
- total cargo: 150,000 tonnes.

3.2.26 As set out in Chapter 4: Existing Site and Operation, it is predicted that by 2038, passenger throughput would increase to approximately 62.4 million passengers per annum in the absence of the Project. This is influenced by three main factors.

- Growth in runway utilisation in off-peak periods: whilst GAL is anticipating only minor changes in the number of daily aircraft movements during current peak summer months (July to September), during the off-peak periods – the shoulder months of summer (April to June and October) and in the winter months (November to March) – the number of daily aircraft movements is expected to increase by a greater amount than in the peak months.
- Up-gauging of aircraft fleets to larger aircraft: reflecting the trend for airlines to update their fleets with larger aircraft and/or reconfigured cabins with more seats.
- Increased load factors: an increase in the average occupancy levels of flights.

3.2.27 Despite a seemingly positive outlook, this level of forecast growth represents a 3% decline in Gatwick's share of the UK south east aviation market without the Project. The decline would be from 26% of the market in 2019 to 23% in 2047 (Appendix 4.3.1 Table 8.2.1) – a decline driven by the severe constraints on capacity at the airport.

3.2.28 Further details of forecast growth, and the factors that underlie it, are provided in Chapter 4: Existing Site and Operation and the Forecast Data Book (Appendix 4.3.1).

3.2.29 The Project would enhance Gatwick's capacity, enabling the airport to respond to demand within its catchment. With the Project, through the early 2030s, Gatwick is forecast to grow towards 70 million passengers, reaching 75.6 million by 2038; 13.2 million more passengers than would be the case without the Project. This growth would see Gatwick capturing a greater share of London demand as other airports will have relatively limited capacity to grow further. The economic benefits of this expansion are analysed in the Economic Impact Report prepared by consultants Oxera (2021) submitted alongside this PEIR.

The Need for Capacity at Gatwick

3.2.30 Gatwick is a key piece of national infrastructure, an economic engine for local and regional growth, and the airport of choice for millions of passengers; serving an extensive catchment with a growing population. In 2019, it was ranked 12th in the world for the number of long-haul destinations served. Gatwick contributed £5.3 billion to the UK economy (pre-pandemic) and has supported over 85,000 jobs.

3.2.31 In 2019 Gatwick Airport handled some 285,000 aircraft movements, serving over 46.6 million passengers travelling to 228 destinations with 53 different airlines. Until 2017, Gatwick had the world's busiest single runway (55 aircraft movements per hour) [2], and still has the world's busiest single runway operation during the day.

3.2.32 This intensity of operation brings particular challenges. With a declared runway capacity of up to 55 movements per hour, Gatwick processes an aircraft approximately every minute. That sustained intensity is greater than any other runway and it is forecast to increase. For the total summer season (April to October), daily commercial air traffic movements are forecast to increase 7% from an average of 851 in 2019 to 915 in 2038 and to 927 in 2047.

3.2.33 Whilst the forecasts suggest that some incremental growth is possible in response to intense demand, in practical operational terms, by normal standards, Gatwick as a single runway airport is 'full'. This was recognised as long ago as 2013 by the Airports Commission, whose interim report recorded that:

"Gatwick operates at over 85% capacity over the course of the year and above 90% in the summer peak season. Almost no take-off or landing slots are un-used in the busiest hours of the day." (Airports Commission 2013, paragraph 3.55).

"Gatwick is operating at more than 85% of its maximum capacity and is completely full at peak times. It is becoming increasingly difficult for airports and airlines to operate

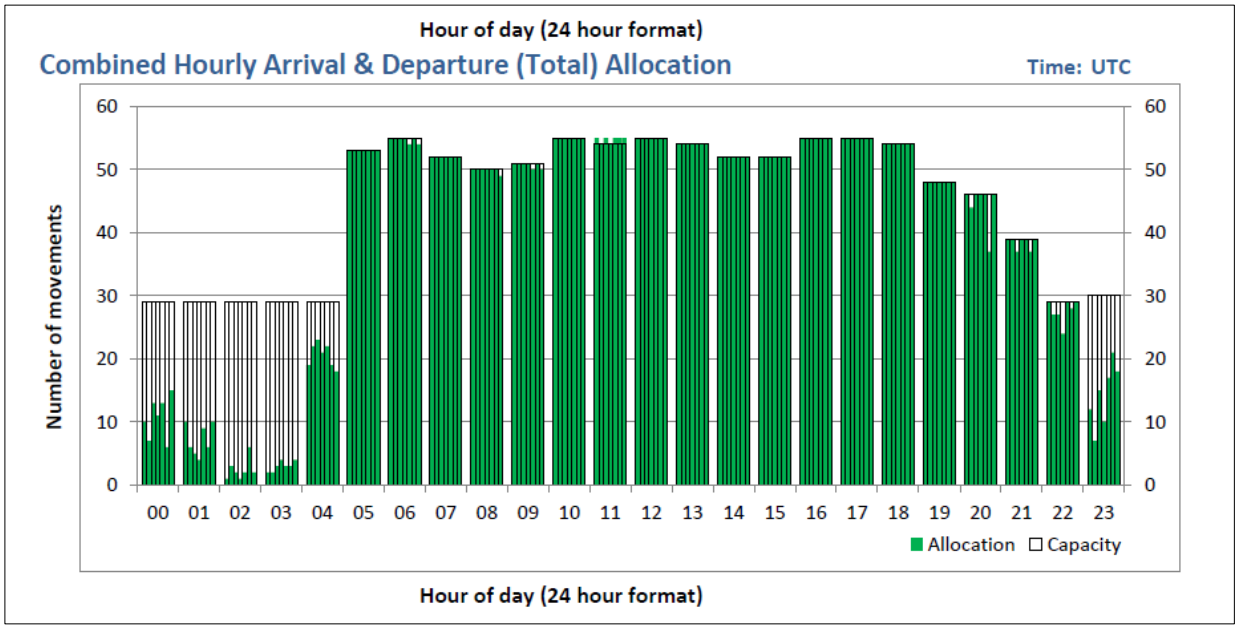
[2] In 2018, Mumbai International Airport created a new world record for single-runway operations handling 980 arrivals and takeoffs in 24 hours

efficiently within the constraints of existing infrastructure". (Airport's Commission 2013 paragraph 20).

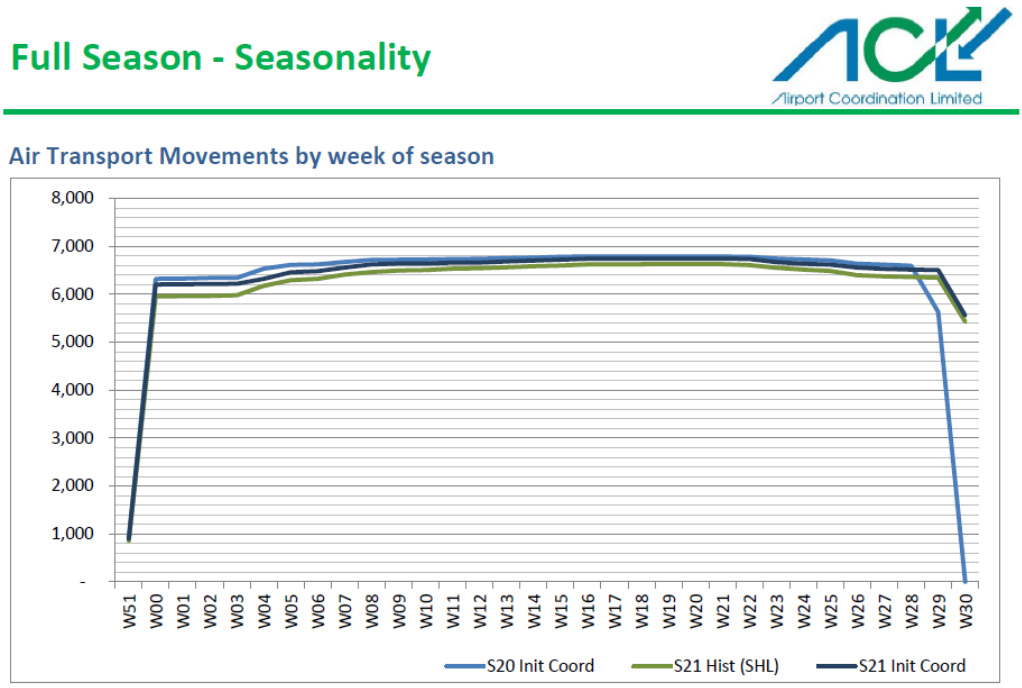
3.2.34 Since that analysis, throughput at Gatwick has grown by 8.5 million passengers, more than any other UK airport (see Appendix 4.3.1).

3.2.35 Graph 3.2.1 and Graph 3.2.2 below demonstrate that this intensity of activity is sustained throughout the majority of the day and is a feature of the airport for much of the year.

Graph 3.2.1: Combined Hourly Arrival and Departure (Total) Allocation



Graph 3.2.2: Air Traffic Movements by Week of Season



3.2.36 A key benefit of the Project is enhanced operational resilience, particularly the ability for the airport to recover from unexpected events. Appendix A3 of the Economic Impact Report (Oxera, 2021) demonstrates that Gatwick suffers greater than average delays from scheduled flight times compared to any other UK airport, with obvious consequences for airlines and businesses.

3.2.37 Airports publish key performance indicator data, which allow comparison to be made with other airports[3]. The data demonstrate the following.

- Aircraft taxi times for departures at Gatwick (at more than 19 minutes) are comparable to Heathrow, despite the size of the airport, on the opening of the northern runway project, these are forecast to reduce by 33%.
- On average planes are held on the runway pending departure for more than 7 minutes, the increased capacity from the Project would reduce this by 43%.
- Delays in runway availability cause arriving planes to take longer routes or adopt airborne holding patterns. These could be reduced by at least 25% with the availability for use of the northern runway (with the Project).

3.2.38 These are average conditions but operating consistently with a full schedule also means that the airport can struggle to recover from routine but unplanned events or from more serious incidents. Recovery capacity is a key indicator of airport resilience and an inability to recover quickly from disruption can have disproportionate effects on airlines, airport staff and passengers. It can also impact on the local community as planes run late or adopt holding patterns for longer. Gatwick estimates that the airport would be able to recover three times more quickly from disruption if the northern runway was made available – for example, to enable dual runway operations to allow delayed departures to get away and free up the main runway for arrivals. The Project would:

- reduce the intensity of main runway operations to an average of 48 movements per hour;
- maintain continuity of operations, even if one runway is temporarily out of use, avoiding the current loss of time in switching to the standby runway;
- improve capacity at the busiest times by removing smaller aircraft departures from the main runway;
- reduce taxi times and airborne holding times; and,
- reduce the risk of delay and time overruns to the benefit of passengers, airlines and the local community.

3.2.39 The availability of the northern runway would also enable the release of additional slots to meet pent up demand, This would drive connectivity, offer passengers a wider choice of destinations and create competition with consequential benefits to air fares.

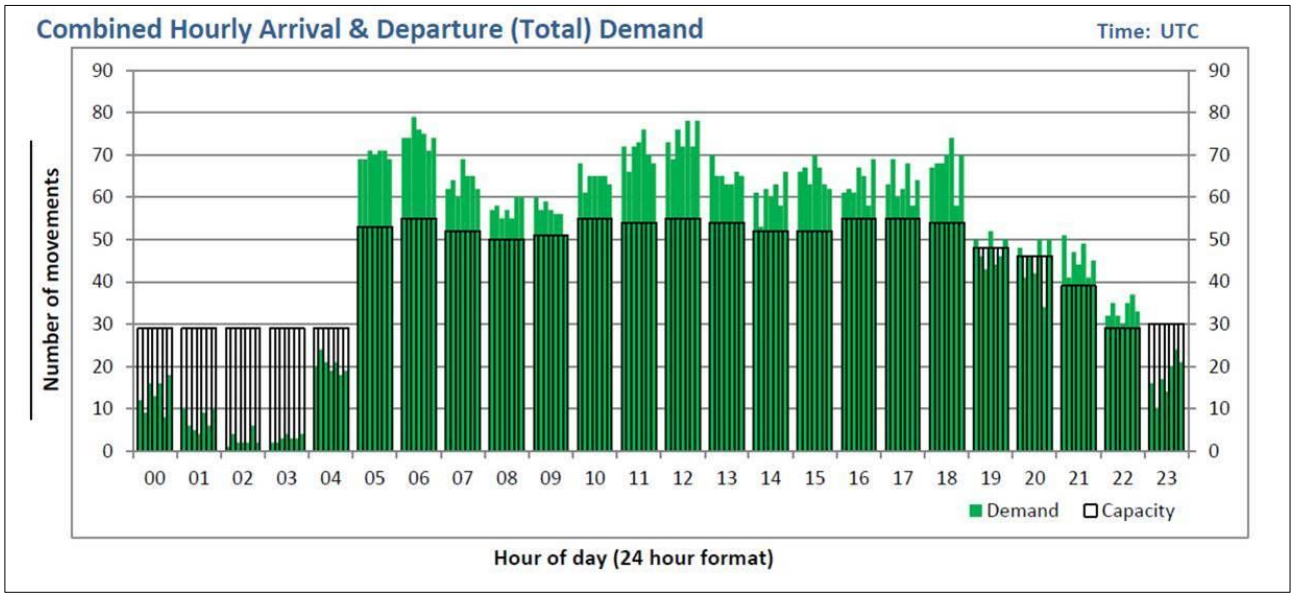
3.2.40 Airport Coordination Limited (ACL) (2019), who are appointed to co-ordinate arrival and departure slots at Gatwick report that demand for runway slots exceeds capacity at peak times:

"*Capacity demand was strong across most hours and days of the week, with demand peaking at 80 movements on runway totals in the 0600 and 1200 hours, that is 25 movements over the declared limit of 55*."

3.2.41 This is illustrated in Graph 3.2.3 below which is extracted from the ACL report:

[3] Eurocontrol coda data for 2018.

Graph 3.2.3: Combined Hourly Arrival and Departure (Total) Demand



3.2.42 There are several consequences of demand outstripping capacity, as described below.

- As Gatwick has become increasingly constrained, a secondary market for slots has started to emerge. The first significant 'trade' occurred when Flybe sold most of their Gatwick slot portfolio to easyJet in 2012. 25 slot pairs were exchanged for an average of £0.8 million per pair. In the last few years, the values attached to Gatwick slots increased significantly, valuing them at around £3 million per pair. These costs are inevitably passed on to passengers.
- Demand cannot be satisfied. Competition for the ex-Thomas Cook slots in 2018 was fierce, with interest from easyJet, Wizz Air, IAG, TUI and other reported bidders. By definition, with current capacity constraints demand is turned away and this includes opportunities for increased competition and, an increased range of destinations.
- Gatwick continues to be actively engaged by airlines around the world seeking to access its unique and large catchment. For commercial reasons, many of the airlines, from all continents, remain confidential. However, recent applicants for slots at Gatwick include:
  - existing airlines seeking to grow both short haul (eg Wizz, Ryanair, easyJet, Turkish Airlines, Vueling) and long haul (eg China Eastern, WestJet); and
  - new airlines seeking to enter the Gatwick market (eg SunExpress, SAS, Alitalia) and long haul (eg China Southern to China, Vistara to India, JetBlue to USA).
- Where demand can be satisfied, the addition of new services adds to consumer choice and drives competition. Recent examples which increased competition, encouraged reduced ticket prices and enable new opportunities include WestJet launching operations to up to six Canadian cities growing the London-Canada market.

3.2.43 Addressing these issues and enabling this increase in capacity, competition and international connectivity is directly consistent with long held and recently restated government policy.

3.2.44 Government policy has been consistently supportive over the last 20 years of making the best use of existing capacity at UK airports to improve performance, resilience and the passenger experience as a sustainable and balanced approach to meeting capacity demand. The Project is a direct and sustainable response to meeting known and future expected demand at Gatwick but also within the London and wider south east regions.

3.3. Alternatives Considered

Legislative Context

3.3.1 The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017, as amended (hereafter referred to as 'the EIA Regulations'), require that an Environmental Statement (ES) should include:

'(d) a description of the reasonable alternatives studied by the applicant, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for the option chosen, taking in to account the effects of the development on the environment;…' (Regulation 14(2)(d)).

3.3.2 In addition, Schedule 4 of the EIA Regulations states:

'2. A description of the reasonable alternatives (for example in terms of development design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects.'

3.3.3 This section of the PEIR sets out the work undertaken to date on alternative options considered by GAL and the key reasons for the selection of the Project elements, taking into account environmental effects.

Gatwick Airport Master Plan Options

3.3.4 As part of the airport planning process, GAL regularly publishes a master plan, setting out long term plans for airport growth and development.

3.3.5 As a result of increasing demand, the 2019 master plan (GAL, 2019) considered the following scenarios:

- Scenario 1: where Gatwick remains a single-runway operation using the existing main runway. This scenario would use technology to increase the capacity of the main runway, leading to incremental growth through more efficient operations;
- Scenario 2: where the existing northern runway is routinely used together with the main runway; and
- Scenario 3: where GAL continues to safeguard for an additional runway to the south.

Scenario 1

3.3.6 Scenario 1 looked at options to make best use of the existing main runway. The master plan predicted that this scenario would see passenger throughput increase to approximately 57 to 61 million passengers per annum (mppa) in 2032 through investments in terminal facilities,

operational efficiency and resilience, improvements to surface access and car parking and provision of additional commercial facilities.

3.3.7 Within this scenario, year on year growth rates would decline as the runway constraints become increasingly binding. Most of the growth would be outside the current peak times and therefore the requirement for additional infrastructure would be relatively modest. With the introduction of quieter aircraft, Gatwick's noise footprint could reduce despite the increase in aircraft movements.

3.3.8 Although the airport could grow to provide for up to approximately 61 mppa with the existing single-runway operation, this growth would be constrained at that level by the limits on available runway capacity. The master plan stated that:

'Even with a third runway at Heathrow, the DfT [Department for Transport] is forecasting a shortfall in UK airport capacity in 2030 and this shortfall is predicted to increase over the following 20 years. Therefore, it is highly likely that by 2032, capacity constraints across the London airport system will mean that some travel demand is unmet, and as a result the UK will lose valuable connectivity to international destinations and markets.'

Scenario 2

3.3.9 The existing northern runway at Gatwick was consented in 1979 and is located 198 metres to the north of the main runway. Its use has historically been constrained by a planning condition and an agreement with West Sussex County Council that prevents its use simultaneously with the main runway. The agreement expired in August 2019.

3.3.10 Scenario 2 proposed that a strip of additional pavement is laid to the northern edge of the existing northern runway, so as to allow the corresponding adjustment of its centreline north of its current position. This would allow the dual operation of the main runway and northern runway together to increase the number of aircraft movements and achieve higher passenger throughput. This is in accordance with Government policy of making best use of existing runways.

3.3.11 The master plan predicted that this option would allow passenger throughput to increase to approximately 68 to 70 mppa by 2032 (and up to 74 mppa by 2038).

3.3.12 Within this scenario the airport would remain a two terminal operation (with some requirement for reconfiguration of airfield and other facilities and for new supporting facilities).

Scenario 3

3.3.13 Scenario 3 would continue to safeguard land for an additional runway to the south of the existing main runway for development at some point in the future. The additional runway scenario was predicted to accommodate a throughput of approximately 95 mppa and would require development of the safeguarded land as well as significantly more changes to the existing airport and surrounding roads.

Conclusion

3.3.14 A do minimum option (Scenario 1) was considered to restrict future growth and Gatwick's ability to contribute to meeting future demand for increased aviation capacity. This option would not allow Gatwick to maintain best use of its existing runways, as only one runway would be operational at any time.

3.3.15 GAL is not actively pursuing Scenario 3 in light of the Government's support for the third runway at Heathrow, but considers that it is in the national interest for the land to continue to be safeguarded to allow for a new runway to be constructed to the south of the airport, to allow for the possibility that it is required in the future.

3.3.16 GAL is pursuing Scenario 2 and, therefore, this PEIR relates to Scenario 2 (use of the northern runway alongside the main runway), given that it results in the following benefits.

- Aligns with Government policy of making best use of existing runways at all UK airports.
- In comparison to the existing situation and Scenario 1, provides greater UK point-to-point airport capacity to assist in delivering unmet Department for Transport-forecasted aviation demand to 2050, whilst complementing the existing UK hub capacity provided at Heathrow (and in view of any additional capacity potentially introduced by the proposed third runway).
- Provides an increase in flights, improved connectivity, increased employment and economic benefits to the local area with a much reduced scale of environmental impact compared to that arising from an additional new runway (Scenario 3).
- Creates economic benefits to the national, regional, and London economies, including through supporting inward investment for business travellers, and tourism.
- Provides additional operational resilience for the airport with the flexibility to routinely use two runways.
- Minimises growth outside of the airport boundary.
- Does not prejudice the long-term safeguarding of the land to the south of the airport for a future additional runway.
- Delivers significant local economic benefits, including further employment and training opportunities for local people, supply chain opportunities for local businesses, increased local retail and leisure expenditure, and other economic stimuli to the local area.

3.3.17 Overall, it is considered that Scenario 2 offers the most sustainable approach to providing greater operational resilience both at Gatwick Airport and improved UK airport capacity compared with Scenarios 1 and 3.

Alternative Design and Technology Options

3.3.18 Making best use of the two existing runways at Gatwick Airport requires alterations to the northern runway to provide a minimum separation distance of 210 metres from the main runway. In turn, this requires relocation of a number of other airfield facilities. In addition, the Project would require amendments to be made to both airside and landside elements of Gatwick Airport, in order to accommodate the increase in aircraft and passenger throughput.

3.3.19 The development of the design for the Project is iterative and will continue to form a key part of the ongoing EIA process. To date, the design has been informed by a number of existing constraints, including:

- the location and layout of existing airport facilities;
- operational airport constraints, such as height restrictions for buildings on or close to the runway and operational areas of the airfield;
- the availability of land within the existing airport and the desire to minimise land take outside the existing airport boundary, as far as practicable;
- the location of existing infrastructure, including the highway network and junctions; and
- the location of existing environmental receptors, including watercourses.

3.3.20 In order to secure an aerodrome license and certification, airports need to demonstrate they comply with Civil Aviation Authority (CAA) and European Aviation Safety Agency (EASA) regulations and specifications as well as International Civil Aviation Organization (ICAO) design recommendations or seek exceptions in the form of deviations from the standard. The main documents that influence design through physical/technical requirements or recommendations for design of aerodromes, runways, taxiways, aprons, aeronautical equipment and other airfield infrastructure are set out below:

- Aerodrome Design Manual - Document 9157 (various dates);
- Annex 14 to the Convention on International Civil Aviation: Aerodromes (ICAO, 2018); and
- CAP 168: Licensing of Aerodromes (CAA, 2019).

Assesment Process

3.3.21 An options appraisal for the design and layout of the Project components has been undertaken by specialists to consider the feasibility and potential impacts of each of the component options. The process assesses each option for suitability, operational viability, cost and environmental effects. The following criteria have been used to identify appropriate options to be considered in the appraisal:

- each option must be an option that is genuinely possible to deliver (ie they must be a reasonable alternative);
- each option must be identified bearing in mind potential implications for other Project components; and
- each option must be identified bearing in mind potential implications for the remainder of the airport that is not proposed to be affected by the Project.

3.3.22 Using these criteria, a number of design and layout options were identified. The following components were considered within the options appraisal.

A. Runways
B. Taxiways
C. Aircraft holding areas
D. Terminals (including International Departure Lounge (IDL))
E. Piers
F. Hangars
G. Hotels, offices and car parks
H. Foul water
I. Surface water drainage
J. Fluvial flood risk mitigation
K. Waste management facilities
L. Longbridge roundabout
M. North Terminal roundabout
N. South Terminal roundabout
O. Rail access
P. Inter Terminal Transit System (ITTS)
Q. Airfield compounds
R. Highways compounds

3.3.23 Table 3.3.1 summarises the criteria used to assess each option.

Table 3.3.1: Assessment Criteria

Category	Sub-criteria
Operations	Safety: Will the option allow for continuous safe operation of the component and the airport as a whole?
	Security: Will the option have any implications on airport security?
	Resilience: Will the option be future proof?
	Airfield operations and performance: Will the option allow for continuous effective and efficient operation of the airport?
	Terminal operations: Will the option have any implications on how the terminals operate?
	Passenger experience: What impact will the option have on passenger experience?
Business Case	Capacity: Will the option be able to accommodate passenger growth of at least 75.6 mppa?
	Capital costs: is it considered to be cost-efficient based on the nature of the works?
	Operating cost: is this a cost-efficient option over the lifespan of the component?
	Airline cost: Will the option impact upon airline revenue, eg servicing aircrafts and / or passengers?
	Value for Money: Does the option represent value for money?
Deliverability	Programme implications: Can the option be delivered within the Project programme (ie can it be operational by the year it is anticipated to be required)?
	Buildability: Are there any engineering constraints and can the component physically be constructed?
	Construction logistics: Are there any complexities or constraints around construction, for example parallel works on another component?
	Safe working: Are there any implications for safety during construction and if so, can these be mitigated?
Planning	Consenting requirements: What consents, licenses or permits are required to deliver the option?
	Consenting risk: Does the component comply with national and local policy and regulatory requirements?
Surface Access	Performance: Will the option allow for the efficient operation of the (altered) surface access network?
	Current network: Will the option have any impacts on the efficient operation of the current surface access network?
	Sustainable Travel: will the option impact upon the existing and future travel opportunities?
Water	Flood risk: Will the option result in any increase or decrease in flood risk and if so, to what extent?
	Water environment: Will the option result in any impacts on the water environment including ground water?
Environment (ecology,	Designations: Will the option result in any harm to designated or non-designated heritage assets?

Category	Sub-criteria
heritage, soils, visual)	Land and soils: Will the option result in the loss of best and most versatile soils or geodiversity?
	Ecology: Will the option result in any impacts on designated or non-designated habitats? Will the option provide opportunities for habitat provision or enhancement?
	Landscape: Will the option result in any impacts on landscape character?
Community (noise, air quality, health, socio-economic)	Emissions: Will the option have the potential to result in emissions that could have an impact on communities (noise, dust or odour)?
	Employment: Will the option impact upon local businesses and/or employment?
Land and Property	Loss of land and/or buildings: Will the option result in a loss of land currently used for other land uses, or existing buildings, in particular where they are not within GAL's ownership?

3.3.24 For each category a colour rated 'scoring' system was used to qualitatively assess each option using professional judgement and experience of the site and surrounding area. The scoring system allowed for a consistent approach to be applied to each category. A description of each category is provided in Table 3.3.2.

Table 3.3.2: Scoring Criteria for Alternative Options

	A good option: Appears likely to be acceptable in terms of the relevant appraisal attributes. Meets land availability, deliverability, cost and business case criteria. Environmental effects and/or consenting risks may arise but on balance appear likely to be acceptable with mitigation.
	A relatively good option. Land agreements, deliverability, cost and business case requirements appear achievable, although not as ideal as a good option. Environmental effects and / or consenting risks may arise but on balance appear likely to be acceptable with mitigation.
	A feasible option: Land agreements, deliverability, cost and business case requirements appear to be achievable but may require compromise. Environmental effects and / or consenting risks may arise but appear likely to be acceptable on balance with mitigation.
	A less feasible option: Where the achievement of land agreements, deliverability, cost and business case requirements may be problematical. Environmental effects and / or consenting risks are likely to arise and it is not certain that all such effects could be successfully mitigated.
	A high-risk option: Effects, policy conflicts and / or consenting risks that are likely to remain after mitigation are likely to carry such weight that the site is unlikely to be granted consent. deliverability and/or cost and business case criteria are unlikely to be achievable.

Summary of Main Alternatives

3.3.25 A summary of the main alternatives and the reasons for selecting the Project layout is provided in the following sections. A table summarising the key construction/operational requirements which have influenced the identification of the options is presented in Appendix 3.3.1. The options taken forward as part of the Project are summarised at the end of each section and summarised in Table 3.3.3.

Runways

3.3.26 Gatwick's existing main runway (08R/26L) has a usable length of 3,311 metres in the 08R (easterly) direction and 3,399 metres in the 26L (westerly) direction[4]. Gatwick's parallel northern runway (08L/26R), is located 198 metres to the north of the main runway. The northern runway is currently not used as a runway at the same time as the main runway. The northern runway is shorter with a length of 3,040 metres in the 08L direction and 2,703 metres in the 26R direction.

3.3.27 In order to operate as a dual runway airport there must be a separation distance of 210 metres between the northern runway and the main runway. This distance is required to meet EASA standards for closely spaced parallel runways.

3.3.28 Four options have been identified based on the requirements set out in Appendix 3.3.1 to ensure the separation distance between runways is maintained. The options considered are presented below.

- Option A1 - moving the existing northern runway centreline north by 12 metres to achieve a separation distance of 210 metres. This enables the main and northern runway to operate simultaneously, in a dependent dual runway configuration. This option would also require moving Taxiway Juliet northwards, alterations to Taxiway Lima, provision of end around taxiways and provision of a runway holding area for the northern runway.
- Option A2 - challenge the EASA 210 metre separation distances. This option would involve CAA approval of a safety case to permit the airport to operate both runways simultaneously in a dependent dual runway configuration, whilst separated by 198 metres. The northern runway would remain as is today, 198 metres away from the main runway, however other enabling airfield works would still be required. This would include moving Taxiway Juliet northwards, alterations to Taxiway Lima, provision of end around taxiways and provision of a runway holding area for the northern runway. This would necessitate a robust safety case to validate that a dependent operation of two closely spaced parallel runways would be safe as the regulations stipulate minimum separation of 210 metres for non-instrumented runways.
- Option A3 - moving the main runway centreline south by 12 metres. This option would involve widening the main runway such that the centreline is moved 12 metres to the south. This option would also require the reconfiguration of navigational aids and equipment servicing the main runway. Other airfield enabling works, such as the re-alignment of Taxiway Juliet, Taxiway Lima, provision of end around taxiways and a runway holding area for northern runway would still be required. The northern runway would remain in its current position.
- Option A4 - re-purpose the northern runway for smaller aircraft only. This option would involve re-sizing the northern runway to restrict operations to Code C aircraft only. This would result in the runway centreline being moved and the runway strip narrowed to accommodate Code C aircraft or smaller only (aircraft categories are described in Chapter 4: Existing Site and Operation). This would provide a 206 metre separation between the main runway and Taxiway Juliet, which is insufficient for simultaneous, closely spaced runway operations. Other enabling airfield works, such as moving Taxiway Juliet northwards, alterations to Taxiway Lima, provision of end around taxiways and provision of a runway holding area for the northern runway would still be required.

[4] 26L and 08R relate to the direction of use of the runway depending on the wind direction. A description of this is provided in Chapter 4: Existing Site and Operation.

3.3.29 Options A1 to A4 are shown on Figure 3.3.1.

3.3.30 Option A1 would require construction works to be undertaken on or near to both the northern and main runways and therefore would require careful phasing and coordination to ensure continual safe operations. Although the option scores slightly lower in terms of the operations criteria compared to some other options, it is still deemed deliverable. Capital costs are considered relatively low compared to other options and the option scores as 'feasible' against the business case. As the extent of the works is contained within the current operational zone, away from many sensitive receptors, the option is therefore deemed to perform well against the environmental, community and surface access criteria. The option is largely within GAL owned land and makes use of existing runways, as set out in Government policy so scores well against the planning and land criteria. Part of the work is located within the fluvial floodplain and would require mitigation.

3.3.31 Option A2 achieves the highest score against the business case, surface access, environment and land on account of there being no capital expenditure and no physical works required to directly deliver the option (although it is noted other works would be required within the airfield to account for additional capacity). It also scores well against deliverability and community impact as a result. However, this option would necessitate development of a new, unprecedented dependent runway model and would reduce resilience capability. Consequently, there is high risk that it would not attain regulatory consent.

3.3.32 Option A3 would require less capital investment compared with Option A1, due to fewer construction works required to deliver the solution. However, this option would necessitate the main runway being out of operation for the period of construction. This would result in the northern runway being used for aircraft operations during construction, which would have a high impact on traffic movement volumes and provide no resilience in low visibility (as the northern runway is a non-instrument runway). As a result, this option scores as 'high risk' against the business case criteria and as 'feasible' against the operations criteria. Some use of third party land would be required to change navigational aids servicing the main runway, meaning the option performs worse than others against the land criteria. Environmentally this option would require the removal of a strip of amenity grassland, albeit of low ecological value. Part of the work is located within flood zone 2 and would require mitigation. As with Option A1, the extent of the works is contained within the current operational zone, away from sensitive receptors. The option is therefore deemed to perform well against the environmental, community and surface access criteria.

3.3.33 Option A4 scores well against the environmental, business case and deliverability criteria. However, it scores as 'high risk' in terms of operations due to impacts on existing infrastructure after the runways are operational. The option also scores as 'high risk' in terms of the planning criteria, since securing regulatory consent would be challenging due to the resulting separation distance being below the regulatory minimum of 210 metres.

Preferred Option

3.3.34 Option A1, whilst presenting challenges that would require careful phasing to operations during construction, in its end state is able to deliver a dependent runway model, which is safe, resilient and generates the requisite capability to meet the business case requirements. Option A1 also scores as satisfactory against the environmental, planning, land, business case and deliverability criteria. As the only option with no high risk ratings, Option A1 is the preferred option.

Taxiways

Taxiway Juliet and other Airfield Taxiways

3.3.35 Gatwick's existing Taxiway Juliet provides a parallel taxiway to the north of the northern runway. In addition, the airfield includes:

- a network of taxiways to the north of Taxiway Juliet, providing the ability for aircraft to move around the airfield and access the existing piers, stands, Taxiway Juliet and the runways;
- an end around taxiway at the eastern end the main runway, connecting to Taxiway Victor; and
- exit/entrance taxiways between Taxiway Juliet and the existing northern runway.

3.3.36 To accommodate the 12 metre strip on the northern edge of the northern runway (preferred Option A1) and increased capacity, a number of alterations to the existing taxiways would be required. Taxiway Juliet would need to repositioned northwards to enable aircraft to use the taxiway independently of northern runway. A new spur (known as the Taxiway Juliet West Spur) would be required to the north west of Taxiway Juliet in order to provide a passing lane and allow air traffic control to effectively sequence aircraft for departure on the main and northern runways during easterly operations. In addition, alternations to Taxiways Lima, Tango, Whiskey, Victor and Zulu would be required to ensure smooth operation of the airfield. Further detail on the proposed changes to taxiways as part of the Project are presented in Chapter 5: Project Description and shown on Figure 5.2.1.

3.3.37 The alterations to these individual taxiways have not been subject to the options appraisal process due to complex safety and operational constraints. The smooth operation of aircraft movement around the airfield relies on a suitable configuration of taxiways, holding areas and piers which are subject to safety standards. The changes to Taxiway Juliet and other taxiways detailed as part of the Project are considered necessary to deliver the realigned Northern Runway as there are no other feasible alternative options and a 'Do Nothing 'scenario would not be compatible with the relocation of the Northern Runway. Therefore, the taxiways have been identified as a 'single option' solution that would assist with aircraft flow and easing congestion on Taxiway Juliet. The changes to the Taxiways Lima and Tango would provide the opportunity to construct additional stands and a pier within the areas adjacent to them. The pier and stand options are considered further below.

End Around and Exit/Entrance Taxiways

3.3.38 Gatwick currently has taxiways between the main runway and the northern runway. Additional taxiways and amendments to the existing taxiways would be required to allow movement of aircraft between the main and northern runways, and between the northern runway and Taxiway Juliet.

3.3.39 Based on the requirements outlined in Appendix 3.3.1, the following options were identified.

- Option B1 - vacate onto a new end around taxiway inside the airport boundary.
- Option B2 - taxi the full length of the runway and wait to vacate at the end.
- Option B3 - arriving aircraft to taxi across the northern runway behind a departing aircraft, further optimised by holding smaller aircraft on exit taxiways between the two runways.

- Option B4 - vacate onto a new dependent end around taxiway at the western end of the airfield but outside the boundary (not a feasible option when the main runway is operating in an easterly direction (08R) due to the train line).
- Option B5 - vacate onto a new rapid exit taxiway to join a new independent end around taxiway outside the boundary.
- Option B6 - a new southern taxiway with rapid exit taxiway connections from the main runway in combination with Option B2, B3 or B4 and within the boundary if possible.

3.3.40 Options B1 to B6 are presented on Figure 3.3.2.

3.3.41 Option B1 would impact upon runway length, due to the reduced runway end safety area. However, from a business case perspective, this option would meet capacity requirements conditional on traffic and flow mix. The option would result in loss of some trees and vegetation. Additionally, the option would require acquisition of third party land to enable delivery. The option scores well in deliverability, for planning, surface access and community. The works would be contained within the existing airport boundary and the solution is estimated to generate negligible noise impact and could be delivered well within the required timeline. This option is located within Flood Zone 3 and would require mitigation.

3.3.42 Options B2 and B3 score well against the environmental, planning and property criteria as they require no new built development and no additional hardstanding. However, the options would not deliver the required capacity, so score poorly against the business case criteria.

3.3.43 Options B4 and B5 score poorly against planning, environment, community and property criteria as they involve development of new infrastructure on greenfield land beyond the western extent of the airport boundary. The works would also require acquisition of third-party land. However, Option B5 is a good option against the operational criteria.

3.3.44 Option B6 scores less well on the business case criterion, being the most expansive and expensive option in terms of build, along with the added requirement to acquire multiple third party sites to the south of the main runway. However, it is considered feasible in terms of delivering the base flow and resilience. In terms of deliverability, the option performs worse than Options B1 to B4 due to the requirement for works in close vicinity to the runway. The option scores poorly against surface access due to the additional construction vehicle movements associated with the scale of construction. Finally, the option scores less well for the environmental criteria due to the location within the flood zone and considerable loss of trees, planting, hedgerows and soil.

Preferred Option

3.3.45 Based on the information presented above, the preferred option arrangement for exit taxiways is a combination of Option B1, B2 and B3. None of the options on their own would deliver the necessary resilience and flexibility required to operate a dual-runway operation and deliver up to 75.6 mppa, but a combination offers flexible, resilient operations that would achieve this objective.

Aircraft Holding Areas

3.3.46 Currently, a holding area known as ‘Alpha Box’ is located east of the northern runway, west of Pier 1 and north east of the main runway. This area serves as a holding and sequencing zone for the main runway, when operating in a westerly direction (26L). When operating in easterly

direction on the main runway (08R), aircraft hold on the northern runway and along Taxiway Juliet.

3.3.47 Based on the requirements set out in Appendix 3.3.1, the following options were identified.

- Option C1 - Beta Box sited predominantly on the existing 140s stands, central to the airfield operation, at the north eastern end of the northern runway. The Beta Box would principally provide eight parking stands adjacent to the northern runway, with the seven 130s stands to the north remaining available as remote serviced stands, as they are today. A Code C taxiway, between 130s and 140s stands would be provided to serve as access and egress route for aircraft utilising the Beta Box.
- Option C2 – Juliet Box sited on the existing Taxiway Juliet, central to the airfield operation, north of the northern runway. The Juliet Box would consist of two Code C centrelines and a single code F centreline, facilitating interdependent flow and holding operation on Taxiway Juliet.
- Option C3 - Charlie Box sited on the existing 130 and 140 stands, central to the airfield operation, northeast of the northern runway. The new configuration would provide aircraft stands and operational aircraft hold points which allow aircraft to be held just prior to accessing the northern runway to optimise runway occupancy efficiency and remove aircraft from busy taxiways. The Charlie Box would include new taxiways across the existing apron area, including: four routes for Code E aircraft linking Taxiway Kilo and the northern runway/Taxiway Alpha November; an east-west route for Code C aircraft to allow independent access/egress from all positions; and two routes for Code C aircraft with a Code F taxi lane on Taxiway Kilo to link with taxiways Papa and Quebec and provide alternative routing for Code F aircraft to the runway.

3.3.48 Options C1 to C3 are presented on Figure 3.3.3.

3.3.49 All options would be located in areas of existing hardstanding within the airport. None of the options would result in any additional greenfield land take or require any land outside of the existing airport. In terms of environmental effects, all score similarly and are not likely to result in adverse effects.

3.3.50 All three of the options score ‘good’ or ‘relatively good’ against the planning, surface access, environment, community, water and land criteria. In terms of deliverability, Option C3 scores ‘feasible’, which is less favourable than Options C1 and C2. All three options score ‘less feasible’ against the business case criteria; all options show different constraints in terms of operation and the mitigation required. Option C1 scores ‘high risk’ for operability criterion because it fails to provide a through route for Code F traffic, meaning that the northern runway would need to be utilised. Option C2 scores ‘high risk’ because it necessitates complex aircraft coordination which could present risks.

Preferred Option

3.3.51 Option C3 would deliver against all stated requirements, apart from business case, where this was assessed as ‘less feasible’, as did Options C1 and C2. However, the impacts that cause the option to score ‘less feasible’ can all be successfully mitigated without compromising the other requirements. This is not possible with Options C1 and C2 which would continue to score ‘high risk’ for other standards. Option C3 is therefore the preferred option.

Terminals (including International Departure Lounge (IDL))

3.3.52 Gatwick's existing passenger terminals are the North Terminal and South Terminal. They are directly served by the M23 motorway spur off the M23, which runs approximately 1.7 km to the east of the airport. The airport sits on the Brighton-London mainline railway. Gatwick Airport's railway station is located at the South Terminal, and there is a direct transit link to the North Terminal. The North Terminal opened in 1988, and the South Terminal opened in 1958. The existing terminals have gross floor areas of approximately 98,100 m^2 and 119,300 m^2 respectively (not including the piers or those parts of the baggage operation that are outside of the terminal buildings).

3.3.53 A number of options have been identified to address the increase in passenger numbers associated with dual runway operations. The options include new terminal buildings as well as extensions to the existing terminals. Based on the requirements set out in Appendix 3.3.1, the following options were identified.

- Option D1 - 'do nothing' scenario, ie no changes would be made to the existing North and South Terminals. The existing terminals would have to cope with the additional passenger throughput of up to 75.6 mppa.
- Option D2 - a new terminal in the north western part of the Project site on current airport car parking land to provide a total terminal capacity for 75.6 mppa. New surface transport modes (eg additional shuttle links) to provide access to the new terminal would be required.
- Option D3 - a new terminal in the southern part of the Project site, to the south of the main runway, to provide a total terminal capacity for 75.6 mppa. New surface transport modes (eg additional shuttle links) to provide access to the new terminal would be required. The new terminal and a new pier (which would also be required for this option) would be constructed on land currently safeguarded for another runway, which is outside of the existing airport boundary.
- Option D4 - expand the existing South Terminal only to provide a total terminal capacity for 75.6 mppa.
- Option D5 - expand the existing North Terminal only to provide a total terminal capacity for 75.6 mppa.
- Option D6 - expand both existing South and North Terminals to provide a total terminal capacity for 75.6 mppa. The forecourts and approaches to both existing terminals would be enhanced, with routes providing access to the terminal frontage, multi-storey and long stay car parks, hotels and pick-up and drop-off areas for different transport modes.

3.3.54 Options D1 to D6 are presented on Figure 3.3.4.

3.3.55 Although Option D1 would result in the lowest costs and lowest environmental impacts as no changes would occur, it would not be capable of accommodating the proposed increase in passenger throughput. This is due to space and capacity limitations within the terminal buildings to accommodate the increase in passenger numbers. Therefore, this option has been discounted.

3.3.56 As a result of being located within the airport on land already occupied by hardstanding, none of the other options are likely to result in significant issues relating to water/flooding, environment (ecology, heritage, soils, visual) or community (noise, air quality, health, socio-economic) impacts, with the exception of Option D3. Option D3 is located on the southern edge of the operational airport and would be likely to be visible from receptors outside of the airport. In relation to

operational, business, planning and land-related matters, some options score significantly better than others.

3.3.57 A new terminal, as outlined in Options D2 and D3, would provide the required capacity but would be expensive to deliver and operate. Extensive landside infrastructure would be required to get the passengers to and from the terminal (especially to / from the train station). In addition, Option D3 would require the considerable acquisition of land and would prejudice long term development in an area currently safeguarded for a new runway (in the event that it is required) outside of the airport boundary.

3.3.58 Options D4 and D5 are both deliverable. However, the terminals do not currently have sufficient pier infrastructure to accommodate the anticipated passenger numbers and therefore infrastructure would need to be increased significantly. The extensions to each terminal would occur on airport land, however the facilities which would need to be displaced to create room for the terminal expansion may result in third party land take. Extending only one terminal could also create surface access issues.

3.3.59 Option D6 would create the smallest expansion requirement in each terminal with the fewest consequential requirements in terms of additional pier infrastructure or displaced areas requiring relocation. The option also scores well in relation to the environment and community as the extensions would occur within the airfield would not require any additional greenfield land take.

Preferred Option

3.3.60 Option D6 performs best overall as it maintains a balanced split of demand that makes the best use of the combined residual capacity in each terminal, thereby limiting the size of expansion required in each. This option would not require the acquisition of additional land outside of the airport boundaries, as the expansion would be undertaken within existing boundaries and this balance of growth would avoid placing too much pressure on any particular element of surface access infrastructure, eg North or South Terminal roundabouts.

Piers

3.3.61 Gatwick Airport currently supports six piers from which passengers embark and disembark aircraft (Piers 1, 2 and 3 at the South Terminal and Piers 4, 5 and 6 at the North Terminal). The number of aircraft stands serviced by each pier is dependent on the type and size of aircraft. Additional pier capacity would be required to support the additional number of aircraft movements and maintain current standards for pier service for passengers.

3.3.62 Based on the requirements set out in Appendix 3.3.1, the following 12 options have been identified:

- Option E1 - Pier 6 extension full service[5] proposal;
- Option E2 - new tower stand full service proposal:
- Option E3 - new tower stands (fast-turn);
- Option E4 - new Pier 7 in the location of the existing cargo facility (single loaded[6]);
- Option E5 - new Pier 7 in the location of the existing cargo facility (double loaded[7]);
- Option E6 - Pier 6 extension (single loaded);

[5] A full service pier allows passengers to board aircraft via a boarding bridge or jetty.
[6] A single loaded pier only allows aircraft to access one side of the pier.
[7] A double loaded pier allows aircraft to access both sides of the pier.

- Option E7 - Pier 6 extension (double loaded);
- Option E8 - Pier 4 and 5 reconfiguration;
- Option E9 - Pier 5 west extension;
- Option E10 - new Pier 7 immediately south and west of the existing cargo facility (single loaded);
- Option E11 - Pier 3 western extension; and
- Option E12 - other Pier 3 alternative options (enhancement and reconfiguration).

3.3.63 Options E1 to E12 are shown on Figure 3.3.5.

3.3.64 None of the options would require any greenfield land take or land take outside of the current airport boundary. Options E2, E3, E4, E5 and E10 would all involve the construction of new piers located: in the existing location of the cargo facility (E4 and E5), to the south and west of the cargo facility in an area of car parking (E10) or in the location of existing remote stands to the north of Taxiway Juliet (E2 and E3). Options E4, E5 and E10 would introduce aircraft to a part of the airfield which currently doesn't experience aircraft movement, resulting in noise and air quality emissions closer to receptors to the north west of the airport (mainly the Bear and Bunny Nursery, Povey Cross and the River Mole corridor). All other options are located in an area of the airfield currently supporting aircraft movement.

3.3.65 Options E1, E6 and E7 would involve the extension and/or reconfiguration of Pier 6, while Options E8, E9, E11 and E2 include the extension and/or reconfiguration of other piers. The deliverability of Options E1, E2, E3, E8, E9 and E11 would involve complex airfield reconfiguration which would result in major disruption to the airport during construction. Similarly, due to the location of Options E6, E7 and E12, the flow of aircraft within the airfield would be severely disrupted (both during construction and operation) meaning these options have been discounted. Options E4 and E5 would be located in the area of the existing cargo centre meaning displacement of the cargo functionality could result in these options being cost prohibitive.

Preferred Option

3.3.66 Option E10 was the only option that scores no lower than 'feasible' against any of the criteria and performed best overall. The case for selecting Option E10 as the preferred option is further supported by its proximity to the proposed Taxiway Lima extension. The linking of a newly constructed pier and associated stands in this location would provide for the optimum free-flow of aircraft on the taxiway system and avoid the risk of delays caused by congestion associated with the vast majority of the other options. The loss of car parking spaces can adequately be re-provided in other parts of the airport. The options for car parking are provided later in this chapter (paragraphs 3.3.88 to 3.3.92).

Hangars

3.3.67 There are currently four existing on-airport hangars which are operated by British Airways, Virgin Atlantic, easyJet and Boeing. It is currently anticipated that a further hangar would be required as part of the Project. The hangar would be required to house facilities for larger aircraft.

3.3.68 Based on the requirements set out in Appendix 3.3.1, the following options have been identified:

- Option F1 - a site which is currently used for car parking (Long Stay Summer Special car park);

- Option F2 - a site adjacent to Hangar 6 (British Airways Hangar) (south of the main runway) currently used for car parking;
- Option F3 - a site within an area of the airport known as Oscar, adjacent to the existing Virgin hangar;
- Option F4 - a site currently used for Long Stay Summer Special car parking (block park storage and front of house provision); and
- Option F5 - land adjacent to the Boeing Hangar.

3.3.69 Options F1 to F5 are presented on Figure 3.3.6.

3.3.70 All options are located within the airport boundary and are located in areas of existing hardstanding.

3.3.71 Option F1 is a feasible option in terms of operational requirements and business case, albeit it would impact the availability of car parking, which would need to be re-provided elsewhere. No issues in terms of deliverability, planning or environmental factors are considered likely.

3.3.72 Option F2 would present significant concerns in terms of operational requirements as it would require aircraft to cross the runways. This option would also reduce car parking which would need to be re-provided elsewhere. No issues are envisaged with deliverability, planning or environmental factors for this option.

3.3.73 Options F3 and F4 raise concerns in terms of operational and business case requirements as the useable areas proposed (taking into account the need to share the space with other airfield infrastructure) are insufficiently sized for larger aircraft. The location for F3 would also be required for new stands and therefore a hangar co-located in this location would interfere with the movement of larger aircraft using Taxiway Juliet. Option F4 is located in the preferred areas for the construction of a new pier (see paragraph 3.3.66) and Taxiway Lima, therefore, the option would require consideration of the deliverability of other necessary airport infrastructure. These options would also require construction in a congested part of the airfield. Both options are partially located within flood zones 2 and 3 and therefore additional mitigation would be required. No further issues are envisaged with deliverability, planning or environmental factors for these options.

3.3.74 Option F5 raises concerns in relation to operations and the business case, as the area is insufficiently sized to deliver the hangar, associated infrastructure and manoeuvring areas. Due to the location, Option F5 would be more straight forward in terms of construction compared to F3 and F4. The location is adjacent to the River Mole corridor and Pond A and is located within flood zones 2 and 3. Therefore, appropriate drainage infrastructure and pollution control would be required during construction and operation. In addition, areas of grass would need to be removed to allow for the construction of this option.

Preferred Option

3.3.75 Option F1 performed best overall, in particular against the operations criteria given it provides a site of sufficient size allowing for other airfield infrastructure and would be contiguous with an existing taxiway. Its location is well placed in relation to the emerging preferred pier and stand options and Taxiway Lima extension works and would not compromise the smooth running of other airfield operations.

Hotels, Offices and Car Parks

3.3.76 Gatwick is currently served by a number of on and off-site hotels with eight on airport hotels, providing approximately 3,000 rooms in total. Gatwick also has on-site car parking, providing approximately 46,700 passenger and staff spaces (as of summer 2019). In addition, there is approximately 34,590 m^2 of on-site office space in main office buildings. In the absence of the Project (in the future baseline scenario), additional capacity is currently planned to be implemented as follows:

- extension to the existing BLOC hotel (approximately 200 additional bedrooms);
- reconfiguration of the existing Hilton hotel to provide 50 additional bedrooms;
- multi-storey car park (MSCP) 4 (South Terminal): 1,500 spaces;
- MSCP 7 (North Terminal): 2,750 additional spaces; and
- use of robotics technology within existing long stay car parking areas to increase capacity, resulting in an additional 2,500 spaces.

3.3.77 In addition to the above, it is anticipated that the Project would generate a requirement for:

- up to 1,000 additional hotel bedrooms on-airport (further capacity may be required off-site, to be provided by third parties if/when required
- approximately 9,000 m^2 of additional office floor space; and
- approximately 18,500 additional car parking spaces.

3.3.78 Based on the requirements set out in Appendix 3.3.1, the following options have been identified:

- Hotels
  - Option G1 - located within the existing car park H;
  - Option G2 - located within the existing car park Y; and
  - Option G3 - located at a building compound adjacent to the car rental site.
- Offices
  - Option G4 - provision of office space within the site of car park H; and
  - Option G5 – provision of office space within the site of car park Y.
- Car Parks
  - Option G6 - new surface car park in the location of Pentagon Field;
  - Option G7 - new decked car park in the location of Pentagon Field;
  - Option G8 - new MSCP in the location of existing car park H (1) (north);
  - Option G9 -– new MSCP in the location of existing car park H (2) (south);
  - Option G10 - new MSCP in the location of existing car park Y;
  - Option G11 - new MSCP in the location of existing car park J (currently used for car rental);
  - Option G12 - new decked parking in the location of existing self-park north car park (one deck);
  - Option G13 - new decked parking in the location of existing self-park north car park (additional deck);
  - Option G14 - new car park in the location of Crawter's Field;
  - Option G15 - new decked car park in the location of existing car park X; and

- Option G16 - new decked car park in location of existing valet MA-1 car park.

3.3.79 Options G1 to G16 are presented on Figure 3.3.7.

Hotels

3.3.80 A number of the options score well and could be taken forward as design solutions; however, no single option alone would be capable of delivering the solution required

3.3.81 Option G1 scores well against all criteria as it proposes new development within an existing area of built development/hardstanding within close proximity to the South Terminal and the train station, with an existing access to the South Terminal roundabout. There are anticipated to be limited impacts upon the environment or community and the site is within the airport boundary. However, additional tall built infrastructure could be visible from receptors within and outside of the airport.

3.3.82 Option G2 scores lower than the other options in terms of business case and deliverability. The land could also be needed for flood storage. G2 would require the consideration of adjacent land uses, including the potential for land to be used as a construction compound. The site for G2 and G3 (in part) are located within Flood Zone 3 and G2 may be visible from Riverside Garden Park and adjacent properties.

3.3.83 Option G3 performs well against all criteria. As it does not impact upon existing car parks, affecting instead the car rental (which has been temporarily relocated due to current station works and could remain in this new area permanently), it scores higher than Options 1 and 2 against the operations and business case criteria.

Preferred Option

3.3.84 None of the options assessed score as ‘high risk’ against any of the criteria and Options G1 and G3 score well across all criteria. Whilst not performing as well as Options G1 and G3 in terms of the business case, deliverability criteria and water criteria, Option G2 is considered to be a ‘feasible’ option given the requirement to provide sufficient provision to serve the future capacity requirements (ie 1,000 additional on-airport bedrooms). Options G1 and G2 would separately have the capacity to fulfil the entire quota of 1,000 rooms, however based on the need to balance additional hotel space between both terminals and to allow choice and suitable access for passengers, all three options are considered the preferred options.

Offices

3.3.85 In terms of the office provision, Option G4 scores well against all criteria on account of being located on existing hardstanding within proximity of the South Terminal, train station and the South Terminal roundabout. There are not anticipated to be any large scale impacts upon the environment or community and the site is located within GAL ownership.

3.3.86 Option G5 scores lower than Option G4 in terms of the business case and deliverability as a result of the requirement to provide underground tanks and the potential interfaces with adjacent uses, including a potential construction compound. The site is located within Flood Zone 3 and may be visible from Riverside Garden Park and adjacent properties.

Preferred Option

3.3.87 Option G4 performs well against all criteria. It is better located to support sustainable transport, would not give rise to impacts from flooding, is anticipated to be less likely to give rise to potential environmental and community impacts and is capable of providing for office floorspace required. Option G4 is therefore the preferred option.

Car Parks

3.3.88 A number of the options score well and could be taken forward as design solutions; however, no single option alone would be capable of delivering the solution and number of spaces required.

3.3.89 Options G6 and G7 have links to existing bus routes and use current entrance/entry points, and would therefore offer a good passenger experience, with no operational or safety issues envisaged. However, these options would involve the development of a greenfield site and would therefore require drainage to be provided to ensure no increase in flood risk. Development of this greenfield site would be visible from adjacent roads and public rights of way both within and outside the Project site boundary. Both options are adjacent to ancient woodland and a red Archaeological Notification Area (West Sussex) and therefore appropriate mitigation would be required to avoid a potential impact.

3.3.90 Options G8 to G13 would also offer a good passenger experience to access the terminals as they are either within walking distance or could include a relatively easy transfer (via bus). Options G10 and G11 are partially situated in a Flood Zone 3 and would require appropriate drainage to be provided to ensure no increase in flood risk. Options G12 and G13 would have limited environmental constraints, due to the existing use of the site as a long-term car park. All of these options (G8 to G13) would involve the conversion of surface parking to decked or multi-storey parking. Options G8 and G9 would be visible against an already built up view being located adjacent to the South Terminal. Option G11 is not likely to be visible outside of the airport boundary due to its location next to the North Terminal. Options G10, G12 and G13 are located close to the airport boundary and therefore have the potential to be visible from outside of the airport (depending on height). However, as for other options, these would be seen in the context of existing airport infrastructure, some of which are tall in nature.

3.3.91 Options G14, G15 and G16 are all located on the southern boundary of the airport and rely on existing access. They are the three furthest options from both the North Terminal and South Terminal and therefore would require additional internal transfer capabilities or only used for staff parking. Option G14 is located in Flood Zone 3 and would require extensive drainage works. The access and drainage work would result in higher construction costs. Furthermore, Options G14 and G15 are situated adjacent to multiple watercourses, archaeological sites and listed buildings, which would require appropriate mitigation measures to be developed. The location of Option G16 has also been identified as a feasible location for a construction compound (see paragraphs 3.3.168 to 3.3.171).

Preferred Option

3.3.92 Due to the need to provide for up to 18,500 additional parking spaces and on the basis that there may be several areas of existing parking lost in order to facilitate a number of Project related works, it was initially proposed that all of the options, apart from Option G16 (due to the proposed construction compound), were the preferred options. Further work undertaken following that initial decision has identified a potential solution (requiring increased decking elsewhere) that allows

Option G14 (Crawter's Field) to be avoided. Therefore, the preferred solution incorporates all options apart from G14 and G16.

Foul Water

3.3.93 Foul drainage from the South Terminal, which pre-dates the establishment of Crawley Sewage Treatment Works (STW), drains north to the Horley STW. This catchment includes the developments to the east of the railway and flows are pumped where necessary but generally leave the airport under gravity. The North Terminal and the airfield drain south to the Crawley STW. Based on the requirements outlined in Appendix 3.3.1, the following 11 options have been identified and are presented on Figure 3.3.8.

- Option H1 – South Terminal. Upgrade main pipeline to Horley STW which would improve flow from the South Terminal to Horley STW removing the pinch point.
- Option H2 – South Terminal. Re-route two existing pipelines (pumping station 19 and 23) to Crawley STW to reduce future flow to Horley STW.
- Option H3 – South Terminal. Storage tanks provided with managed release to Horley STW which would reduce the peak flow to maintain current loads.
- Option H4 - South Terminal. Pipeline and sewer line upgrade to solve localised pinch point.
- Option H5 – South Terminal. Connection to Crawley STW underneath the railway line to reduce future flow to Horley STW.
- Option H6 – New GAL owned waste water treatment works where all additional flows generated by growth could be handled on-site.
- Option H7 – Airfield. Relocate pipelines and pumping station to accommodate relocation of Taxiway Juliet to an alternative location.
- Option H8 – Airfield. Reinforce pipeline at pumping station 3 to allow the relocation of Taxiway Juliet and reduce ingress of storm water.
- Option H9 – Airfield. Add a new pipeline to accommodate relocation of Taxiway Juliet and combine with flows from two existing pumping stations (pumping station 2 and 3) in to one new pumping station.
- Option H10 – North Terminal. Route to Horley STW to reduce all loads to Crawley STW making room for growth in the region.
- Option H11 – North Terminal. New pipeline and pumping station to solve localised pinch point.

3.3.94 A number of the options score well and could be taken forward as design solutions; however, no single option alone would be capable of delivering the solution required. The options which perform best in terms of deliverability are Options H2, H4, H9 and H11. These options would create additional capacity without affecting existing operations. Therefore, disruption to the foul network during operation would be limited. Some works would be required to deliver H4 however these would be limited.

3.3.95 Options H2, H3, H6, H7 and H8 score poorly in terms of cost due to maintenance and additional facilities within GAL control.

3.3.96 Option H2 would avoid an area known as Horleyland Wood, designated as ancient woodland and as a Local Wildlife Site to avoid the loss of habitat. Options which score lower in terms of the environment are H5 and H10, which could result in significant disruption to the local highway network and the residents in Povey Cross (Option H10). Option H10 would also require the crossing of the River Mole and pass through an area of woodland. Option H6 is located within an

area of greenfield land and would require appropriate drainage incorporated into the design of any facility.

3.3.97 Option H1 scores poorly with regard to deliverability as there is a high dependency on third-party land and it has been assumed that the STW in Horley is full and would not be expanded. The option could also have impacts upon the existing highway network, creating delays as a result of temporary closures in order to deliver the improvements.

3.3.98 Option H5 is considered a less suitable option in terms of business case and deliverability requirements, due to the complexity of delivery across/below water, roads and railway. The option also scores poorly in terms of planning, surface access and environment given the potential impacts upon the river and associated habitats and potential delays caused on the highway network.

Preferred Option

3.3.99 Options H2, H9 and H11 could be combined together to create an overall solution which could meet the capacity requirements. The combination of options would avoid the need to construct a new storage facility or carry out works that could require crossing the railway, river, areas of ecological value or highway network, which could potentially give rise to greater impacts upon surface access, environment and community. Therefore these three options are included in the Project.

3.3.100 In the event that there is not sufficient capacity within the existing Thames Water Treatment Works or that improvements cannot be made to provide this capacity, an expansion to the existing Crawley Sewage Treatment Works may be required. This could be undertaken separately by Thames Water. However, an area of land has been identified to allow the expansion on land owned by GAL, in case this is required.

Surface Water Drainage

3.3.101 The airfield has several catchments that are discharged into local water courses via balancing ponds: Ponds E and F drain to the Gatwick Stream, and Ponds A, M, Dog Kennel and Pond D drain directly to the River Mole in accordance with discharge consent. If the water quality in Ponds A, M and Dog Kennel does not meet the discharge consent standard it is routed through Pond D for treatment and quality control preventing pollution of the River Mole. If necessary polluted water can be pumped to Gatwick Airport pollution lagoons for further treatment before being discharged to the river system.

3.3.102 Based on the requirements set out in Appendix 3.3.1, five options have been identified to control the increase in surface water runoff which would occur as a result of the Project and to mitigate the loss of existing ponds to Project features.

- Option I1 – re-provision of Pond A in a location known as Museum Field owned by GAL;
- Option I2 – reconfiguration of Pond A drainage catchment so it drains to pond M instead;
- Option I3 – creation of an open storage pond for additional surface water storage prior to Pond D;
- Option I4 – creation of underground storage at car park Y for additional surface water storage prior to Pond D, maintaining development opportunities for the land; and
- Option I5 – move Pond A north in line with Taxiway Juliet providing local storage and relocate the River Mole.

3.3.103 Options I1 to I5 are presented on Figure 3.3.9.

3.3.104 Option I1 is considered to be high risk against the business case criteria as the option would prevent this land being used for fluvial storage capacity (see below). In terms of deliverability, the option is considered feasible. Against the water criteria the option is considered 'less feasible' as it would affect existing watercourses, whilst in terms of the environmental criteria the works would result in some tree loss and potential impacts upon soils and buried archaeology. As a result of these potential impacts, the option scores as 'feasible' against the planning criteria as it is considered to be only partially compliant with planning policy.

3.3.105 Option I2 scores poorly with regard to business case criteria compared with a number of other options given the costs associated with establishing and operating a pumping station. The construction would require significant and close coordination given airfield interfaces, meaning the option scores as 'feasible' against the deliverability criteria. As the option is located within the airport and would not result in any loss of planting or habitats, it scores positively in terms of planning, surface water, land, community and environment.

3.3.106 Option I3 scores poorly in business case terms as it would result in the loss of existing car parking which would need to be replaced. Its location near to a number of existing and potential Project works means it scores as 'less feasible' given the potential interfaces and complexities. As there is potential for some tree loss depending on the exact location of the pond and impacts upon soils, the option scores lower than several others in terms of the environment. In terms of surface access, it is considered that the displacement of the existing car parking spaces could give rise to impacts on the surrounding network. As a result of the potential environmental and surface access impacts, the option scores lower than several others against the planning criteria as these impacts may result in some non-compliance with planning policy.

3.3.107 Option I4 underneath car park Y performs well against operations criteria and scores better than the other options in terms of business case, though it may result in the loss of an area that could be used for commercial uses. In terms of deliverability, the option is considered feasible, though sequencing of the works could give rise to programme delays due to interfaces with other potential works. There would be potential impacts on soils and archaeology.

3.3.108 Option I5 scores well operationally as it would provide a source of buffering and reduce the requirement for car park Y storage (Option I4). There are some deliverability impacts associated with sequencing the works in order to ensure there are no impacts on the existing infrastructure. The option scores positively against all other criteria.

Preferred Option

3.3.109 Options I4 and I5 perform best in relation to the operations criteria. Option I4 scores the highest in relation to the business case for which other options (such as Option I2) score poorly. Both options present some complexities in relation to deliverability, though are still considered viable. These options perform positively against planning and water criteria Whilst Option I4 would result in potential impacts upon archaeology, the option is still considered to be feasible. Therefore, both Options I4 and I5 are the preferred options.

Fluvial Flood Risk Mitigation

3.3.110 Due to the reconfiguration of the hardstanding and drainage features associated with the Project, additional fluvial flood risk mitigation would be required to ensure there is no increase to flood risk

off-site and that the operation of the airfield remains resilient to flooding. The River Mole flows through the airport, passing under the main and existing northern runways in culvert. Tributaries of the River Mole, including the Crawter's Brook, the Gatwick Stream and Westfield Stream all run through or adjacent to the Project site

3.3.111 The final arrangement and location of the fluvial mitigation will be determined by detailed modelling work undertaken to support the Flood Risk Assessment submitted for the ES. A draft Flood Risk Assessment is provided at Appendix 11.9.1 of the PEIR.

3.3.112 Based on the requirements set out in Appendix 3.3.1, 10 options for additional storage have been identified at this stage:

- Option J1 – located within and adjacent to land known as Museum Field;
- Option J2 – located at the existing Summer Holiday Parking;
- Option J3 – located within car park X;
- Option J4 – located within car park Z;
- Option J5 – located within car park B;
- Option J6 – utilising an area to the east of Gatwick Stream, retaining existing trees;
- Option J7 – utilising an area to the east of Gatwick Stream, removing existing trees;
- Option J8 – utilise the areas in between the proposed End Around Taxiway West;
- Option J9 – utilise the areas in between the proposed End Around Taxiway East; and
- Option J10 – relocate the existing River Mole into a two-stage channel providing additional flood alleviation.

3.3.113 Options J1 to J10 are presented on Figure 3.3.10.

3.3.114 Option J1 performs strongly across all criteria. Whilst the site is greenfield land, it is anticipated that the works provide the opportunity for habitat improvements and therefore score as a good option with regard to the environment. It is anticipated that the works can be undertaken independently of any other works as they are away from airfield operations. The site is located outside of the existing airport boundary but is within GAL ownership. However, given its identified need and the potential benefits it can offer, the option scores as feasible for the planning criteria.

3.3.115 Option J2 is considered a high risk option against the business case criteria as it does not contribute significantly to achieving the target protection. It would also result in the loss of parking spaces which would need to be re-provided.

3.3.116 Option J3 is considered feasible against the business case criteria. However, it would result in the loss of parking spaces which would need to be re-provided. The option could be delivered over the winter months to minimise the extent of car parking space loss over the busier period. The option would result in some tree loss and potential impacts on soils.

3.3.117 Option J4 and J5 scores poorly against the operational criteria as it is anticipated that it would not provide sufficient protection against flooding. The loss of parking spaces and loss of trees and soils results in the option scoring lower than a number of other options.

3.3.118 Option J6 and J7 scores well against the operations criteria as it is considered capable of offering the necessary protection from flooding. As the works can be undertaken independently of other linked works it scores as a good option for deliverability. The loss of trees and soils mean the option scores as feasible in terms of environment. Option J7 scores low in terms of community as

the loss of trees adjacent to the STW could potentially reduce the visual and noise screening for the community.

3.3.119 Option J8 and J9 scores as high risk against the operations criteria as it is considered to offer poor protection against flooding and potentially give rise to safeguarding issues. In terms of deliverability, the restriction on construction hours to avoid impacts on runway operations were considered to affect the programme. The cost of delays is considered to have a potential impact on the business case.

3.3.120 Option J10 is an opportunity created by the option chosen for surface water (Pond A) and scores well against all criteria, although there are some concerns around the proximity of an open watercourse near the airport boundary in relation to attracting birds.

Preferred Option

3.3.121 Options J1, J3, J6 and J10 perform best in combination overall and are the preferred options. In addition to the options that are anticipated to provide the necessary additional flood risk mitigation, there may be a requirement for additional works to existing surface water infrastructure, runoff areas and treatment solutions (many of which are detailed above as part of the Surface Water and Foul Water Drainage options). A requirement for any such works will be identified through further design development and detailed water modelling for the ES.

Waste Management Facilities

3.3.122 Gatwick's existing waste management facilities are located within an area of the existing airfield known as Oscar to the north of Taxiway Juliet. The Central Area Recycling and Waste Enclosure (CARE) facility comprises a biomass boiler, a waste processing building, compound area and bin store. This area is required to be reconfigured to provide space for other airfield components as part of the Project. The relocated CARE facility would include a flue stack up to a maximum of 50 metres in height (above ground level).

3.3.123 Based on the requirements set out in Appendix 3.3.1, two options for the relocation of the CARE facility have been identified:

- Option K1 – in an area currently used as valet north 'Flying Pan' car park (north of the cargo facility); and
- Option K2 – in an area currently used as car park self-park north.

3.3.124 Options K1 and K2 are presented on Figure 3.3.11.

3.3.125 Both options are located in areas of existing hardstanding and therefore no greenfield land take would be required. Both options would require measures to be put in place to ensure their resilience to surface water flooding.

3.3.126 Option K1 is located slightly further inside the airport boundary, and is considered more favourable in terms of the business case (reducing the distance travelled by waste vehicles). There is considered to be a lower probability of the waste management site being visible from outside the airport and there would be no requirements to construct a new enabling roadway to service the development, meaning the site scores better from a surface access perspective.

3.3.127 Option K2 would require heavy goods vehicles (HGVs) to travel a greater distance within the airport to reach the facility. This option would be located closer to the airport boundary therefore the flue stack could potentially be slightly more visible from outside the airport.

Preferred option

3.3.128 Whilst Option K1 scores marginally better in terms of the business case, surface access and environment criteria, both options perform well overall. Only one option would be required however at the current time both options have been assessed within PEIR. These options will be refined and one option will be taken forward for the ES.

Surface Access

3.3.129 In order to accommodate the proposed increase in passenger numbers accessing the airport, and taking into account other known and planned developments in the area, improvements are required to the highways that serve the airport to add capacity. It is anticipated that works would be required to the Longbridge Roundabout, North Terminal Roundabout and South Terminal Roundabout. This section describes the appraisal process undertaken for different options for these three junctions. The options have been developed as part of the traffic modelling in accordance with Transport Analysis Guidance (TAG) (Department for Transport, 2018). Due to the availability of specific guidance, the appraisal of the surface access options has been undertaken using a separate methodology. Further details of the design process is provided in Appendix 12.9.1 (Preliminary Transport Assessment Report (PTAR)) of the PEIR.

3.3.130 The preferred options for surface access are provided on Figure 3.3.12.

Longbridge Roundabout

3.3.131 Longbridge Roundabout is located to the north of the airport and is currently a four-arm signalised roundabout where the A23 intersects with Povey Cross Road and the A217. Pedestrian crossing facilities are provided on each arm of the junction.

3.3.132 The design iteration process included a number of options being tested through strategic modelling of the highway network. A full description of the options considered through this process is provided in Annex C of Appendix 12.9.1 (PTAR). A summary of the options are provided here:

- Option L1: existing roundabout to be replaced with a signal-controlled junction;
- Option L2: local improvements to the existing signal controlled roundabout whilst retaining the existing junction footprint; and
- Option L3: improvements to the existing signal controlled roundabout to increase the junction size and capacity.

3.3.133 Option L1 involves upgrades to each of the four arms of the junction including widening of the running lanes. Pedestrian and cyclist facilities would be retained at each arm of the junction via staggered signal-controlled crossings. These changes would provide safety benefits compared to the existing layout, in particular in relation to HGV turning movements. The existing supporting structure for the left turn lane from A23 Brighton Road onto A23 London Road would be retained minimising construction costs and habitat removal. This option however, would not provide sufficient capacity to accommodate the Project. Significant costs would be involved to change the

junction from a roundabout to a signal controlled junction, including the upgrade or provision of a new A23 Brighton Road overbridge.

3.3.134 Modelling was undertaken to identify if Option L2 could accommodate the increased traffic volumes associated with the Project. Under this option the existing roundabout central island would be retained, avoiding design changes that would result in requiring additional land. This option aims to minimise the impact to adjacent residential and commercial properties and avoid impacting the existing segregated left turn lane and the associated stilt structure. The results showed that it is not likely sufficient capacity would be provided by this option. Furthermore, safety issues pertaining to the existing layout related to insufficient carriageway width would not be addressed with the implementation of Option L2.

3.3.135 Option L3 would result in an enlarged junction footprint. The existing elevated stilt structure that supports the junctions segregated left turn lane between A23 Brighton Road and A23 London Road would need to be modified or replaced. The A23 Brighton Road overbridge that passes over the River Mole would also need to be modified or replaced to accommodate changes to the highway footprint on the A23 Brighton Road. These modifications would increase the construction costs however the option would provide the sufficient capacity required.

Preferred Option

3.3.136 Of the three options assessed for Longbridge Roundabout, only Option L3 would provide the required capacity for the modelled increase in traffic as a result of the Project. Therefore Option L3 is the preferred option.

North Terminal Roundabout

3.3.137 The North Terminal roundabout is the entry point to the North Terminal and local access roads, including the northern and east perimeter roads. The existing layout consists of a circular five-arm at-grade roundabout to the north east of the North Terminal, to the south west of the A23. There is currently no direct entry to the roundabout southbound from Horley and no direct exit from the roundabout on to the A23 southbound towards Crawley. Further local improvements, involving signalisation and minor widening of entries / exits, are proposed in the absence of the Project.

3.3.138 Improvements to the roundabout are considered necessary to mitigate capacity impacts arising as a result of the Project.

3.3.139 The design iteration process included a number of options being tested through strategic modelling of the highway network. A full description of the options considered through this process is provided in Annex C of Appendix 12.9.1 (PTAR). A summary of the options are provided here:

- Option M1: grade separated junction – provision of an at-grade elongated gyratory junction with a through route for the A23 London Road via a flyover constrained by Riverside Garden park and Gatwick estate, constrained to 40mph;
- Option M2: grade separated junction – provision of an at-grade elongated gyratory junction with a through route for the A23 London Road via a flyover constrained by Riverside Garden park and Gatwick estate, constrained to 50mph;
- Option M3: grade separated junction – provision of an at-grade elongated gyratory junction with a through route for the A23 London Road via a flyover using land from Riverside Garden Park to the north, constrained to 50mph;

- Option M4: grade separated junction – provision of an at-grade elongated gyratory junction with a through route for the A23 London Road via a flyover using land from the Gatwick estate to the south, constrained to 50mph;
- Option M5: at-grade signal controlled junction – existing roundabout junction to be replaced with an at-grade signal controlled junction providing free flow links between the A23 London Road, Airport Way and the North Terminal. A through route for the Airport Way Westbound connection onto the A23 London Road Northbound to be provided via a flyover; and
- Option M6: at-grade offline signal-controlled junction – modifications to the existing North Terminal roundabout with the provision of a new offline roundabout in Staff Car Park Y. Improvements to Longbridge Way and Longbridge Way roundabout to facilitate changes in traffic flow.

3.3.140 Options M1 and M2 would lead to the existing Northern Terminal roundabout being replaced with an elongated gyratory junction with connections to adjacent roads being modified accordingly. A grade-separated junction arrangement would introduce a through route for the A23 London Road, raising the carriageway over the gyratory junction via a four-span viaduct. Option M2 would involve a longer flyover alignment to account for the faster speed limit of 50mph. These two options would not result in the permanent land take of Riverside Garden Park north nor would they encroach on GAL owned land to the south. The junction layout would remain largely within the existing highway boundary. The options would allow for non-airport traffic to bypass the junction reducing the volume of traffic required to use it.

3.3.141 The options for M1 and M2 would however require the constriction of retaining wall structures and potential works to the Inter Terminal Transit System (ITTS) viaduct structure (further details on the ITTS is provided below). The works would be likely to result in substantial disruption to road users during construction. Due to complex construction sequencing these options are likely to lead to higher costs compared with at-grade layouts.

3.3.142 Options M3 and M4 would be similar to Options M1 and M2 however the works would not be constrained to the existing highway boundary allowing the A23 to be moved to the northeast (Option M3) or developing the gyratory further to the south (Option M4). This would allow greater distances between slip roads and a greater flexibility for links to the south of the junction. Option M3 would result in the loss of land from Riverside Garden Park which would impact on recreational use of the park. Similarly, Option M4 would result in the use of GAL owned land to the south of the junction, impacting on the ITTS viaduct, Perimeter Road and some airport infrastructure. Option M4 would also result in impacts on the Shell Filling Station and the Premier Inn Hotel. As with Options M1 and M2 the works would be likely to result in substantial disruption to road users during construction.

3.3.143 Option M5 would replace the existing roundabout with an at-grade signal-controlled junction, providing a number of free flow links between the A23 London Road, Airport Way and the connector roads to the North Terminal facilities. An at-grade solution resolves access problems and mitigates the forecasted increase traffic volumes at the junction whilst minimising the extent of construction works, environmental impact and disruption to the existing network through the reduced junction footprint. The option would remain largely within the existing highway boundary minimising the land take of Riverside Garden Park.

3.3.144 Option M6 is an at grade solution modifying the existing North Terminal roundabout junction and introducing a new offline roundabout at the existing GAL Staff Car Park Y. The primary function of

this roundabout would be to provide a connection between the A23 London Road northbound and southbound to the GAL estate. The option introduces issues within the GAL internal road network, which would require a significant upgrade to cope with the increased traffic using Perimeter Road North and Longbridge Way. It is anticipated that this option would demonstrate issues with queuing on Perimeter Road North and Longbridge Way and could block the exit from the North Terminal. There is also potential for queuing traffic to back up the GAL internal highway network and the surrounding road network. There would be no loss of land from Riverside Garden Park if this option was taken forward.

Preferred Option

3.3.145 Option M5 is the preferred option as it would provide the required capacity to accommodate in the increase in traffic flows as well as reducing the impact on Riverside Garden Park and GAL estate land to the south. The option would result in lower disruption during construction compared with some of the other options.

South Terminal Roundabout

3.3.146 The South Terminal roundabout (also known as the Welcome Roundabout) is the sole entry point into the South Terminal area and for local access roads, including the terminal forecourt, long stay car parks and commercial premises. It is served by the M23 Gatwick Spur to the east (leading from the M23 Junction 9) and Airport Way from the west (leading from the North Terminal roundabout). The majority of Gatwick traffic accesses the airport from the M23 and traffic for both North Terminal and South Terminal must pass through this roundabout. The M23 Gatwick Spur has recently been upgraded as part of the Highways England M23 Smart Motorway Project. The hard shoulder of the westbound carriageway has become a permanent running lane, providing a total of three lanes approaching the airport. Further local improvements, involving signalisation and minor widening of entries / exits, are proposed in the absence of the Project.

3.3.147 Improvements to the roundabout are considered necessary to mitigate capacity impacts arising as a result of the Project.

3.3.148 The design iteration process included a number of options being tested through strategic modelling of the highway network. A full description of the options considered through this process is provided in Annex C of Appendix 12.9.1 (PTAR). A summary of the options are provided here.

- Option N1: grade separated junction - M23 Spur/Airport Way Flyover (40mph);
- Option N2: grade separated junction - M23 Spur/Airport Way Flyover (50mph);
- Option N3: grade separated junction including a northern access arm to accommodate future potential developments to the north - M23 Spur/Airport Way Flyover (50mph); and
- Option N4: grade separated junction with an elevated roundabout and a new through route for the M23 Spur/Airport Way.

3.3.149 Option N1 includes the provision of a flyover for the M23 Spur/Airport Way to maintain a through route over the existing at-grade roundabout. The M23 Spur/Airport Way mainline would be designed to be suitable for a 40mph speed limit. Access to the South Terminal would be maintained in its current position and new slip roads would be provided to link the existing roundabout to the flyover. This option builds upon Option N2 (below) and the 40mph limit was designed to test if the B2036 Balcombe Road overbridge could be retained. However, modelling

suggests that it is likely the overbridge would need to be replaced. The option would allow the free movement between the M23 Spur and Airport Way, removing non-airport traffic from the junction. This would result in less congestion and a safer highway environment. The retention of the at grade roundabout would reduce costs and disruption to road users during construction. The footprint of Option N1 is also smaller than some of the other options (N3 and N4) and therefore would result in less land take.

3.3.150 Option N2 would be similar to Option N1 however, the speed limit over the flyover would be increased to 50mph, tying back into the 40mph limit on Airport Way to the west of the junction. The higher speed limit would increase capacity at the junction although would require the replacement of the B2036 Balcombe Road overbridge. The earthworks associated with constructing the flyover and slip roads would require increased land-take beyond the existing highway boundary and would impact existing buildings to the south of the mainline, as would Option N1. The option however, would provide the required capacity to mitigate the effects of the Project traffic on the junction.

3.3.151 Option N3 is the same as N2 however, this option would accommodate additional traffic resulting from potential future developments to the north of the South Terminal. The design would include a new northern arm on the at-grade roundabout to access such potential future developments. The access provision would include two new segregated left turn lanes to facilitate traffic entering and exiting the northern arm. The capacity of the M23 Spur eastbound merge slip road would be increased through the provision of a second lane and an increase in the proposed length of the slip road. This option shares similar benefits to Option N2 however it also allows for future capacity if required. The additional northern arm would result in greater land take than Options N1 and N2 and would increase the cost of construction. The requirement for future potential developments to the north of the junction has not been confirmed at this design stage, therefore this option was not progressed further in the traffic modelling.

3.3.152 Under Option N4 the South Terminal roundabout would be elevated introducing an at-grade through route for the M23 Spur/Airport Way underneath. Access to the South Terminal, car parking and hotels/offices would be maintained to the south and slip roads would be provided to link the roundabout circulatory carriageway back to the existing M23 Spur/Airport Way. The proposed design speed for the through alignment and slip roads would be suitable for a 40mph speed limit under the assumption that the same speed limits would be applied to key routes at the North Terminal. The key benefits of this option include the provision of a through route to non-airport traffic which would also improve safety. The B2036 Balcombe Road overbridge would also be partially retained reducing costs and disruption. This option, however, would result in larger land take and would involve substantial earthworks and retaining walls. This would increase the disruption during construction and result in greater costs.

Preferred Option

3.3.153 Option N2 is the preferred option as it provides the capacity required to accommodate the increase in traffic while minimising the associated land take. The 50mph proposed for N2 limit would allow greater capacity through the junction compared with the 40mph limit of Option N1 and would tie into the existing 40mph limit on Airport Way.

Rail Access

3.3.154 Gatwick Station is located adjacent to the South Terminal. The station is predominately located on Network Rail's operational land. However, sections of the site fall within the ownership of GAL. It is anticipated that Gatwick will see a sustained increase in rail mode share over the next 10 to 15 years. The rate of change will depend on a number of factors, including the maintenance of a reliable and punctual service. Improvements to Gatwick Station are the subject of a separate planning application, with construction ongoing. The current works include an upgrade to almost double the size of the station concourse and provide additional lifts and escalators, improving access to platforms and the passenger experience. The enhancement will provide for further growth in rail passengers and mode share. These improvements are anticipated to be complete in 2022.

3.3.155 Based on the requirements set out in Appendix 3.3.1, three options have been identified:

- Option O1 – do minimum which involves seeing the completion of the Gatwick Station improvements outlined above;
- Option O2 - extension of a new station concourse over Platform 3/4, with additional escalators/lifts/stairs to and from platform level; and
- Option O3 - extension of a new concourse to full deck, with additional escalators/lifts/stairs to and from platform level.

3.3.156 Options O2 and O3 are shown on Figure 3.3.13.

3.3.157 Option O1 scores well across all topics as it would involve maximising the use of the improvements that are currently under construction. Therefore, no additional construction or operational costs would be required and there would be no construction works that could give rise to environmental impacts, or requirements for further consents or land. Initial analysis indicates that, upon completion of the works, there will be sufficient capacity at the station to accommodate the proposed increase in passengers and the future rail travel targets.

3.3.158 If further work shows a need for additional capacity of Gatwick Station, Options O2 and O3 offer the ability to provide this.

Preferred Option

3.3.159 Option O1 is the preferred option as it is considered that it would still provide the necessary capacity required to accommodate the anticipated future passenger numbers without adversely affecting airport operations and passenger experience. With funding already in place and works being completed independently from the Project, the option scores well in terms of deliverability and business case.

Inter Terminal Transit System

3.3.160 The ITTS is an automated people mover (monorail shuttle service) which links the South Terminal and North Terminal. This currently operates two three-car trains every few minutes between the terminals.

3.3.161 Based on the requirements set out in Appendix 3.3.1, the following options have been identified.

- Option P1 – Do minimum. This assumes no change to the current operation (frequency and hours of operation) or capacity. The existing system would be maintained until end of life and a subsequent business decision would be made on refurbishment or replacement.
- Option P2 – Optimise current operating pattern. This assumes that the current system would be optimised to operate at its maximum frequency (a shuttle every five minutes on each track in peak periods) and maintenance schedules are amended to increase capacity availability in accordance with peak demand.
- Option P3 – Extend to four-car trains and extend platforms. This assumes that as well as optimising the service (Option P2) both trains would be lengthened by adding an additional carriage, thereby increasing capacity by 33%.
- Option P4 – Add crossover for maximum platform utilisation. This assumes that two crossovers would be installed along the track allowing up to four trains to operate at once and minimising wait times for passengers. Train lengths would be optimised to accommodate peak demand (two-car or three-car trains).
- Option P5 – Add bypass loops and maintenance area. This assumes a similar operation to Option P4 but with the introduction of a maintenance area midway along the tracks to allow trains to be taken out of service without reducing station capacity.

3.3.162 Due to the nature of the options only Options P3, P4 and P5 are shown on Figure 3.3.14. The other options are not able to be visually represented.

3.3.163 Option P1 would not meet full capacity/operational requirements for growth up to 75.6 mppa so there would be an anticipated deterioration in passenger experience, which could impact on safety, and the potential for increased maintenance requirement and risk of reduced service. Option P2 makes best use of the existing system with the lowest business cost and impacts. By avoiding any infrastructure changes it represents a neutral business decision for system life and/or replacement/refurbishment. Neither of these options would have any adverse impacts on the environment as no additional built infrastructure would be required.

3.3.164 Options P3, P4 and P5 would all require some form of built infrastructure by way of platform extension or rail infrastructure. Based on the positioning of the ITTS within the airport no greenfield land take would be required. The additional track infrastructure associated with Options P4 and P5 would only be likely to be visible within the airport; however, the canopy extensions associated with the extended platforms for Option P3 could be visible from outside the airport.

3.3.165 Of the options delivering additional physical capacity, Option P3 would have the least impact and cost but with some disruption during construction.

3.3.166 Options P4 and P5 would require changes to the trackwork of the system, which may be incompatible with future operations, noting potential refurbishment/replacement. The options could result in an unknown period of disruption during construction.

Preferred Option

3.3.167 Further work will determine the scale of intervention necessary to adequately cater for demand, noting that some improvements can be made within the existing operation. The PEIR assesses Option P3.

Construction Compounds

Airfield Compounds

3.3.168 A number of generally small scale compounds are currently located on the airport which are used to support ongoing construction works. However, it is anticipated that the scale of the Project would result in the need for additional compound capacity. The compounds would need to provide space for a number of activities and must be located centrally for access to most airport construction activities. Further details on the requirements are included in Appendix 3.3.1.

3.3.169 A number of on-airport options were identified, most of which were considered to be inappropriate in terms of location and size to be viable alternatives and therefore weren't considered further. Four options located outside of the Project site boundary were identified for potential airfield construction compounds (Figure 3.3.15) and a further three inside the boundary. These seven options are considered in this chapter.

- Option Q1 – field to the south of the airfield and London Road, outside the Project site boundary.
- Option Q2 – field to the south of the airfield and London Road, outside the Project site boundary adjacent to the A23.
- Option Q3 – field to the south of the A23 and airfield, outside the Project site boundary.
- Option Q4 – field to the south of the A23 and airfield, outside the Project site boundary and to the east of Option Q3.
- Option Q5 – land adjacent to the existing Boeing hangar north of the northern runway.
- Option Q6 – land adjacent to the British Airways hangar to the south of Taxiway Yankee.
- Option Q7 – land adjacent to the British Airways hangar to the south of Taxiway Yankee and north east of Option Q6.

3.3.170 Options Q1 and Q2 are located to the south of the airport boundary on the southern side of London Road. Although the sites would be big enough to contain all the required activities, they are greenfield sites which are currently used for agriculture. A further two sites to the east of Q1 and Q2 (Q3 and Q4) are also located on agricultural land and located adjacent to an area of ancient woodland, therefore scoring poorly in terms of environment. All four of the options are in locations that have potential for buried archaeology and could result in effects on the setting of listed buildings. Options Q1 and Q2 are in an area of land outside of GAL control.

3.3.171 Options Q5, Q6 and Q7 are located within the airport boundary; Q5 next to the Boeing Hangar to the north of the northern runway, and Q6 and Q7 in the far south east of the airfield. These locations would provide the access required to the different areas of the airfield, are within GAL control and would have no impact on the current operation of the airport. Options Q6 and Q7 would not be of a suitable size if they were considered in isolation but could be joined together to provide the required area.

Preferred Option

3.3.172 A minimum of one site north and one site south of the runways are required to ensure works are delivered safely and efficiently. Of the southern options, Options Q6 and Q7 performed best overall given their proximity to the works area and status as areas of existing hardstanding. Both sites are therefore considered as the preferred options. Of the northern options, Option Q5 performed best given its direct access to the airfield and is therefore the preferred option.

Surface Access Compounds

3.3.173 Given the nature of the proposed highway works it is anticipated that at least one construction compound would be required to support these works.

3.3.174 Based on the requirements set out in Appendix 3.3.1, the following options for the surface access construction compounds have been identified.

- Option R1 - located in Reigate Field which is a greenfield site located immediately north of the South Terminal roundabout;
- Option R2 - located in Balcombe Road Field which is a greenfield site located immediately south of the M23 spur;
- Option R3 - use of car park H which is located immediately east of the Hilton Hotel within the airport boundary;
- Option R4 - use of car park Y which is located north west of the North Terminal roundabout within the airport boundary;
- Option R5 - located at Peeks Brook Lane North which is an existing industrial site currently used as a compound for the M23 spur works;
- Option R6 - located at Peeks Brook Lane South which is a brownfield site currently used temporarily as a car park;
- Option R7 - use of the M23 Compound North located north east of the airport alongside the northbound carriageway of the M23 motorway and currently used as a compound to service the M23 works;
- Option R8 - use of the M23 Compound South which is an existing industrial site located on the eastern side of the M23 motorway;
- Option R9 - located at Junction 10 Copthorne is a partially built industrial site containing a number of industrial units; and
- Option R10 - an area adjacent to the River Mole to the north of Longbridge Roundabout.

3.3.175 The above highway construction compound options are presented on Figure 3.3.15.

3.3.176 Options R1 and R10 score best in terms of deliverability given their proximity to the highway works sites. They score lower than several options in terms of planning and environment on account of being greenfield sites that could be of ecological value. They are also located within close proximity to a number of residential properties so score lower than other options with regard to community impacts. The sites are not within GAL ownership. In terms of the business case, the sites are considered to be a relatively good option.

3.3.177 Whilst being well located in relation to the works, Option R2 scores lower with regard to planning and environment given its location outside of the airport. It is also located within close proximity to a number of residential properties so scores lower than other options in regard to community. The site is also outside of GAL ownership. In terms of deliverability, it would require additional works to create the access, but it considered feasible subject to access from the M23 spur being agreed with Highways England.

3.3.178 As existing developed sites (car parks), Options R3 and R4 score well against the planning, environment and deliverability criteria. Option R3 scores poorly for surface access as it would result in impacts for South Terminal access/egress capacity and conflicts with adjacent uses (eg Hilton Hotel), whilst Option R4 is located partially within the floodplain.

3.3.179 Options R5 and R6 comprise existing brownfield sites, scoring well in relation to the environment. However, both are considered to be less feasible options with regard to surface access given the impacts on M23 spur and difficulty gaining vehicle access. Neither of the options are owned by GAL.

3.3.180 Options R7 and R8 perform well in relation to operational requirements, given their location away from the airport. However, both are considered to be high risk options in terms of surface access and deliverability given the access restrictions onto the M23 and the longer traffic routing that would be required to gain access to and from the main highway works sites. Option R8 has previously been used by Highways England and a requirement for compulsory acquisition would be likely.

3.3.181 Option R9 also scores well against operational requirements given its location away from the airport. However, this has meant it scores poorly in terms of deliverability, given the requirement to be located near to the works.

Preferred Option

3.3.182 Whilst Option R1 and R10 score lower than several other on-airport options in relation to environmental and planning on account of being greenfield sites, their proximity to the proposed highway works sites means they score highly in regard to deliverability. The compounds would be temporary and any effects on the environment would be short term in nature. Given the works would take place on a congested section of highway, a key requirement has been for the works areas to be located as close as possible to the work in order to avoid the need for construction traffic to interface with existing traffic on the network. Similarly, Option R4 is located close to the highway works and on an area of existing car parking. Therefore, given their locations adjacent to the existing highway, Options R1, R4 and R10 are the preferred options.

Preferred Options

3.3.183 Following the appraisal process and based on the above, the options identified as performing best against the criteria have been taken forward to form part of the current design for the Project. Table 3.3.3 summarises the preferred option(s) taken forward within the current design and assessed within the PEIR.

Table 3.3.3: Preferred Design and Layout Options

Component	Preferred Option(s)
Runways	Option A1 - moving the existing northern runway centreline north by 12 metres to achieve a separation distance of 210 metres. This enables the main and northern runway to operate simultaneously, in a dependent dual runway configuration.
End Around and Exit Taxiways	Option B1 - vacate onto a new end around taxiway inside the airport boundary. Option B2 - taxi the full length of the runway and wait to vacate at the end. Option B3 - arriving aircraft to taxi across the northern runway behind a departing aircraft.
Holding Areas	Option C3 - Charlie Box.

Component	Preferred Option(s)
Terminals	Option D6 - expand both existing South and North Terminals to provide a total terminal capacity for 75.6 mppa.
Piers	Option E10 - new Pier 7 immediately south and west of the existing cargo facility (single loaded).
Hangars	Option F1 - a site which is currently used for car parking (Long Stay Summer Special car park).
Hotels	Option G1 – located within the existing car park H. Option G2 – located within the existing car park Y. Option G3 - located at a building compound adjacent to the car rental site.
Offices	Option G4 - construction of approximately 13,935 m2 of additional office space on the site of car park H. To be provided by three equally sized buildings.
Car Parks	Options G6 – G15 have all been proposed for inclusion at this stage.
Foul Water	Option H2 – South Terminal. Re-route two existing pipelines (pumping station 19 and 23) to Crawley STW to reduce future flow to Horley STW. Option H9 – Airfield. Add a new pipeline to accommodate relocation of Taxiway Juliet and combine with flows from two existing pumping stations (pumping station 2 and 3) in to one new pumping station. Option H11 – North Terminal. New pipeline and pumping station to solve localised pinch point.
Surface Water Drainage	Option I4 – creation of an underground storage pond for additional surface water storage prior to Pond D, maintaining development opportunities for the land. Option I5 – move Pond A north in line with Taxiway Juliet providing local storage and relocate the River Mole.
Fluvial Flood Risk Mitigation	Option J1 – located within and adjacent to land known as Museum Field. Option J3 – located within car park X. Option J6 – utilising an area to the east of Gatwick Stream, retaining existing trees. Option J10 – relocate the existing River Mole into a two-stage channel providing additional flood alleviation.
Waste Management	Option K1 – in an area currently used as valet north ‘Flying Pan’ car park (north of cargo).
Longbridge Roundabout	L3 – improvements to the existing signal controlled roundabout to increase the junction size and capacity.
North Terminal Roundabout	M5 – at grade signal controlled junction – existing roundabout junction to be replaced with an at-grade signal controlled junction providing free flow links between the A23 London Road, Airport Way and the North Terminal. A through route for the Airport Way Westbound connection onto the A23 London Road Northbound to be provided via a flyover.
South Terminal Roundabout	N2 – grade separated junction - M23 Spur/Airport Way Flyover (50mph).
Rail Access	Option O1 - do minimum.
Shuttle	Option P3 - Extend to four-car trains and extend platforms.

Component	Preferred Option(s)
Airfield Compounds	Option Q5 - Adjacent to the existing Boeing Hangar. Option Q6 - In the location of existing car park Valet MA-1. Option Q7 - In the location of existing car park Valet MA-1.
Highway Compounds	Option R1 - Reigate Field. Option R4 - Car Park Y. Option R10 - Field north of Longbridge Roundabout.

3.3.184 For some options, a conflict of land use has been identified. This is anticipated to be overcome by phasing of the Project construction to allow the same parcel of land to be used for multiple purposes.

3.4. Conclusion

3.4.1 The Gatwick Airport Master Plan (GAL, 2019) reported that Gatwick Airport contributes £5.3 billion to the UK economy and supported over 85,000 jobs prior to the pandemic. At peak times, it is the busiest single-runway airport in the world.

3.4.2 Since publication of the previous master plan in 2012, Gatwick increased throughput by almost 12 million passengers, a greater increase across the six-year period than any other UK airport. Previous Department for Transport forecasts have underestimated Gatwick's growth, forecasting 34 million passengers for 2017, over 10 million less than were actually handled that year. Forecasts indicate that demand is anticipated to return later in 2021, with demand returning to pre-pandemic levels by mid 2020s.

3.4.3 A do minimum option with regard to passenger throughput and airport improvements (Scenario 1) would restrict future growth and Gatwick's ability to contribute to meeting future demand for increased aviation capacity. This option would not allow Gatwick to maintain best use of its existing runways as only one runway would be operational at any time.

3.4.4 GAL is not actively pursuing the option of a second runway to the south of the existing main runway (Scenario 3) in light of the Government's support for the third runway at Heathrow, but considers it to be in the national interest for land to continue to be safeguarded to allow for a new runway to be constructed, if required in the future.

3.4.5 GAL is pursuing Scenario 2 (making best use of its existing runways) and, therefore, this PEIR relates to Scenario 2, given that it results in the following benefits.

- Aligns with Government policy of making best use of existing runways at all UK airports .
- In comparison to the existing situation and Scenario 1, provides greater UK point-to-point airport capacity to assist in delivering unmet Department for Transport-forecasted aviation demand to 2050, whilst complementing the existing UK hub capacity provided at Heathrow (and in view of any additional capacity potentially introduced by the proposed third runway).
- An increase in flights, improved connectivity, increased employment and economic benefits to the local area with a much reduced scale of environmental impact compared to that arising from an additional new runway (Scenario 3).
- Creates economic benefits to the national, regional, and London economies, including through supporting inward investment for business travellers, and tourism.

- Provides additional operational resilience for the airport with the flexibility to routinely use two runways .
- Minimising growth outside of the airport boundary.
- Does not prejudice the long-term safeguarding of the land to the south of the airport for a future additional runway.
- Delivers significant local economic benefits, including further employment and training opportunities for local people, supply chain opportunities for local businesses, increased local retail and leisure expenditure, and other economic stimuli to the local area.

3.4.6 A review of design and layout options has been undertaken through an iterative design process for the Project. This review has taken into account the following criteria:

- operational;
- business case;
- deliverability;
- planning;
- surface access;
- water;
- environment (ecology, heritage, soils, visual);
- community (noise, air quality, health, socio-economic); and
- land and property.

3.4.7 The current design and layout of the Project layout is described in Chapter 5: Project Description. Overall, it is considered that the selected options offer a sustainable approach to providing greater operational resilience both at Gatwick Airport and improved UK airport capacity.

3.5. Next Steps

3.5.1 The option appraisal work will continue throughout the ongoing EIA process and any new options will be appraised against the criteria identified in this chapter. The final ES will include an appraisal of any options identified throughout the consultation period and any changes to the design since the publication of this document.

3.6. References

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3.7. Glossary

Table 3.7.1: Glossary of Terms

Term	Description
ACL	Airport Coordination Limited
ATM	Air transport movements
CAA	Civil Aviation Authority
CARE	Central Area Recycling Enclosure
EAT	End around taxiway

Term	Description
EIA	Environmental Impact Assessment
ES	Environmental Statement
ESEA	European Aviation Safety Agency
GAL	Gatwick Airport Limited
HGV	Heavy Goods Vehicle
ICAO	International Civil Aviation Organization
IDL	International Departure Lounge
ITTS	Inter Terminal Transit System
mppa	million passengers per annum
MSCP	Multi-storey car park
NPS	National Policy Statement
PEIR	Preliminary Environmental Information Report
PTAR	Preliminary Transport Assessment Report
STW	Sewage Treatment Works

Preliminary Environmental Information Report
Chapter 4: Existing Site and Operation

September 2021

Table of Contents

4 Existing Site and Operation

4.1. Introduction

4.1.1 This chapter of the Preliminary Environmental Information Report (PEIR) provides an overview of the existing Gatwick Airport and the key changes that are planned in the absence of the Project. This provides details of the existing and future baseline situation, with regard to the airport and its operations. Details of the Northern Runway Project are provided in Chapter 5: Project Description.

4.2. Gatwick Airport

4.2.1 London Gatwick became an aerodrome in the 1930s and was formally opened as a passenger airport in 1958. Since this time, passenger numbers have grown to over 46 million passengers per year. In 2019 (the most recent full year of operation prior to the Covid pandemic), Gatwick served more destinations than any other UK airport[1].

4.2.2 The operation at Gatwick Airport is served by a single main runway and two terminals: North Terminal and South Terminal. When the main runway is unavailable, the existing northern runway is used. The northern runway was used for 2,842 air traffic movements in 2019.

4.2.3 The extent of the Gatwick Airport boundary is presented in Figure 1.3.1. Key features mentioned in this chapter are shown on Figure 4.2.1 (sheets a to c).

Existing Runway Provision

4.2.4 Gatwick's main runway is designated 08R/26L. This means that when the wind is from the east, aircraft using the runway approach and depart on a heading of 80° (with the runway referred to as runway 08R). When the wind is from the west, aircraft arrive and depart on a heading of 260° (referred to as runway 26L). The 'L' and 'R' annotation is to be read as 'Left' or 'Right', as when pilots approach the active runway, it will appear in their field of view as the left or right of a marked pair of runways. Due to the prevailing wind conditions, the runway is used in the westerly (260°) direction for approximately 75% of the time in a typical year (although this varies year on year). The main runway is an instrument runway[2], measuring approximately 3.3 km in length and a minimum of 45 metres in width, plus runway shoulders.

4.2.5 The existing northern runway is designated 08L/26R. As with the main runway, aircraft arrive and depart on a heading of 80° when the wind is from the east (referred to as runway 08L), and on a heading of 260° when the wind is from the west (referred to as runway 26R). The runway is currently a non-instrument runway[3], measuring approximately 2.6 km in length and a minimum of

[1] Gatwick served 202 destinations in 2019 with annual passenger volumes more than 20k (CAA Statistics).
[2] An instrument runway is one equipped with both visual and non-visual navigational aids which allow for the safe approach and landing of aircraft in all weather conditions, including those periods where low cloud or fog restrict visibility to the pilot. The main navigational aid assisting pilots in their final approach to the runway is known as the Instrument Landing System (ILS). An ILS is composed of two separate pieces of equipment – the localiser and the glidepath aerials. The localiser provides left-right guidance so that the aircraft follows the runway centreline. The glidepath signal provides guidance so that the aircraft follows the correct angle of approach and rate of descent to the runway. There are two separate sets of ILS equipment at Gatwick, one of which will always be active at any one time when the main runway is in use.
[3] A non-instrument runway is one where the pilot is reliant on visual cues (approach and runway lighting, approach path indicators, and paint markings) to make a safe approach and landing to the airport. If the visual cues are not visible to the pilot owing, for example, to fog on the runway or a very low cloud base, then the aircraft may have to hold until conditions improve, or divert to an alternate airport. A non-instrument runway is not equipped with ILS.

45 metres in width, plus runway shoulders. When not in use as a runway, the existing northern runway is used as a parallel taxiway for the main runway.

4.2.6 The existing airport is predominantly used by the following aircraft types, defined in accordance with the International Civil Aviation Organization (ICAO) Aerodrome Reference Code (ICAO, 2017) (second element):

- Code C: aircraft with a wingspan of between 24 metres and less than 36 metres, such as the Boeing 737-700 or Airbus A-320;
- Code D: aircraft with a wingspan of between 36 metres and less than 52 metres, such as the B767 series or Airbus A-310;
- Code E: aircraft with a wingspan of between 52 metres and less than 65 metres, such as the B777/B787 series or A330 family; and
- Code F: aircraft with a wingspan of between 65 metres and less than 80 metres, such as the Boeing 747-8 or Airbus A-380-800.

4.2.7 In addition, a number of smaller Code A and Code B aircraft use the airport for general aviation[4].

Taxiways

4.2.8 The existing Taxiway Juliet provides a parallel taxiway to the north of the northern runway. In addition, the airfield includes:

- a network of taxiways to the north of Taxiway Juliet, providing the ability for aircraft to move around the airfield and access the existing piers, stands, Taxiway Juliet and the runways;
- exit taxiways between the main runway and the existing northern runway; and
- taxiways between Taxiway Juliet and the existing northern runway.

Terminals, Piers and Stands

4.2.9 Gatwick Airport has two passenger terminals: North Terminal, which opened in 1988, and South Terminal, which opened in 1958. The terminals are shown in blue on Figure 4.2.1a.

4.2.10 The existing North and South Terminals have maximum heights of 32 and 40 metres and gross floor areas of approximately 98,100 m^2 and 119,300 m^2 respectively. This includes facilities such as:

- check-in desks;
- security;
- departure lounge;
- outbound baggage;
- gates;
- air bridges;
- immigration; and
- arrival baggage.

4.2.11 In addition, the terminals include offices, shops, restaurants, welfare facilities, baggage handling facilities, boilers and chillers.

[4] General aviation is defined as civil aviation operations other than scheduled air services and non-scheduled air transport operations for remuneration or hire.

4.2.12 The terminals are linked by an inter-terminal tracked transit system (ITTS) with journey times of approximately two minutes between the two. The ITTS is shown in red on Figure 4.2.1b.

4.2.13 Gatwick Airport currently supports six piers from which passengers embark and disembark aircraft (Piers 1, 2 and 3 at South Terminal and Piers 4, 5 and 6 at North Terminal – shown in blue on Figure 4.2.1a). The number of aircraft stands serviced by each pier is dependent on the type and size of aircraft. Many of the airport apron parking stands are configured so that a given stand can be configured to park with one large aircraft in the centre of the stand (usually Code E or F), or two smaller aircraft (Code C and below) side by side. At the current time, the number of stands provided is as shown in the table below.

Table 4.2.1: Aircraft Parking Stands

Aircraft Type	Number of Stand Centrelines (2019)
Code C stands (North Terminal)	41
Code C stands (South Terminal)	38
Code C stands (remote)	62
Code E stands (North Terminal)	17
Code E stands (South Terminal)	16
Code E stands (remote)	27
Code F stands (North Terminal)	1

Note: Number represents the number of stand centrelines, different configurations are available.

Existing Airfield and Supporting Facilities

4.2.14 The existing airport includes a number of facilities required to support the operation of the airfield, including:

- airport fire station (airport fire service);
- central area recycling enclosure (CARE);
- motor transport, surface transport and ground maintenance facilities;
- cargo facilities;
- fire training ground;
- aircraft hangars;
- air traffic control tower;
- noise mitigation, including the existing bund and noise wall;
- internal access routes (including Larkins Road); and
- a fuel storage area (known as the fuel farm).

4.2.15 These features are shown on Figure 4.2.1a. In addition, the main runway operation is supported by an Instrument Landing System (ILS).

4.2.16 In addition to departing and arriving flights, aircraft engine testing (known as aircraft engine ground running) currently occurs within the airfield, including at the eastern and western ends of Taxiway Juliet, on Taxiway Yankee and on the northern runway.

4.2.17 The existing cargo facility occupies an area of approximately 10 hectares, including 23,000 m^2 of cargo sheds, with office accommodation and areas for heavy goods vehicle loading, unloading and parking.

4.2.18 British Airways operates one hangar south of the main runway. In addition, there are currently three hangars to the north of the runway (operated by Virgin Atlantic, Boeing and easyJet).

4.2.19 The CARE and motor transport facilities, along with a number of other supporting facilities (such as pumping stations and substations) are located to the north of Taxiway Juliet and between Taxiways Tango and Sierra.

4.2.20 The existing fire station is located to the north of Taxiway Juliet and south of the air traffic control tower, with a fire training ground located north of the western end of Taxiway Juliet. The Gatwick Airport Fire Service is based at the airport fire station and provides appropriate rescue and fire-fighting cover in accordance with regulatory requirements 24 hours a day, 365 days per year.

Hotel and Commercial Faciltiies

4.2.21 Existing hotels at the airport provide approximately 3,000 rooms (combined). The hotels are:

- Hampton by Hilton - North Terminal;
- Premier Inn - North Terminal;
- Premier Inn (A23 Airport Way) - North Terminal;
- Sofitel London Gatwick - North Terminal;
- BLOC - South Terminal;
- Hilton London Gatwick - South Terminal;
- Courtyard Marriott - South Terminal; and
- YOTELAIR - South Terminal.

4.2.22 The existing hotel locations are shown on Figure 4.2.1b.

4.2.23 Existing main office facilities within the airport provide approximately 34,590 m^2 of floorspace (net internal area).

Car Parking

4.2.24 A range of on-airport car parking is currently provided, including short stay, long stay and staff parking (see Figure 4.2.1b). Approximately 46,700 parking spaces were available in summer 2019 within the airport boundary.

Table 4.2.2: Existing Car Parks (Summer 2019 – last full year pre-Covid)

Type	Number of Spaces
Short Stay	
Multi-storey car parks 1, 2, 3	2,472
Multi-storey car parks 5, 6	2,099
Long Stay	
Self-park south	8,282
Self-park north	6,266
Valet 'Courtland'	3,285
Valet north 'Flying Pan'	966
Valet MA-1	5,372
Valet 'Purple Parking'	821
Summer Special	5,277
Holiday	1,546
South valet	3,363
Commuter and coach	292
Car park Z	570
Total Short Stay and Long Stay	**40,611**
Staff Car Parks	
Car park B	414
Car park Y	916
Car park M	463
Car park X and V	2,644
Car park L	362
Car park W	121
Car park H	1,170
Total Staff Parking	**6,090**
Total Spaces	**46,701**

Surface Access

Highways Connections

4.2.25 Gatwick Airport is directly connected to the M23 via the M23 spur road, approximately 25 miles south of central London.

4.2.26 The South Terminal junction (M23 Junction 9A) currently consists of a three-arm at grade roundabout, with the M23 spur approaching from the east and Airport Way from the west. The southern arm of the roundabout provides access to the South Terminal, car parking and hotels and offices.

4.2.27 The North Terminal roundabout is the entry point to the North Terminal and local access roads, including the north and east perimeter roads. The existing layout consists of a circular five-arm at grade roundabout to the north east of the North Terminal and to the south west of the A23.

Gatwick Station

4.2.28 Gatwick's railway station is located at the South Terminal. There is a direct transit link from the railway station to the North Terminal. The station provides over 120 direct rail connections (no change required), including direct trains to central London. These include the Gatwick Express service to London Victoria as well as the Southern and Thameslink networks. The railway station served over 20 million rail journeys in 2019.

Shuttle Service

4.2.29 The two terminals are connected by the ITTS, an automated people mover (monorail shuttle service). This currently operates two three-car trains every few minutes between the terminals.

Bus Services

4.2.30 Both terminals provide access to local and regional bus and coach services.

Surface and Foul Water Drainage

4.2.31 Within the airport, surface water is managed through existing Ponds A to G, Pond M and Dog Kennel Pond (see Figure 4.2.1c). Rainfall runoff from the airport generally drains via attenuation ponds and pollution control structures to one of three watercourses: Crawter's Brook, Gatwick Stream and the River Mole, in accordance with existing discharge consents.

4.2.32 Foul water currently passes to the Crawley Sewage Treatment Works to the south east of the airport or Horley Sewage Treatment Works to the north east of the airport.

Existing Operation and Maintenance

4.2.33 In 2019 approximately 24,000 staff worked at the airport of which approximately 3,300 were employed directly by Gatwick Airport Limited (GAL). In 2020 with the prevailing pandemic conditions, the number of GAL staff fell to approximately 1,900 although this is expected to return to previous levels in line with recovering passenger numbers in the coming years.

4.2.34 Aviation fuel is stored in a designated area (known as the fuel farm) in the northern part of the airport, to the north of the cargo area.

4.2.35 As part of routine maintenance of the airport, the existing runways are resurfaced every 10 to 15 years. The next scheduled resurfacing of the main runway is due to be completed in 2022.

4.2.36 Two existing areas within the current airport boundary are managed for biodiversity (shown in yellow on Figure 4.2.1c). These are known as:

- the north west zone, located to the north of Taxiway Juliet, which includes ancient woodland at Brockley Wood and part of the River Mole corridor; and
- land east of the railway line (LERL), located in the south eastern part of the site, which includes part of the Gatwick Stream, ancient woodland (Horleyland Wood), grassland and ponds.

4.2.37 Wildlife hazard control is carried out by the airside team, with the aim of maintaining, as far as reasonably practicable, a bird-and-animal-free airfield. This includes bird scaring and other activities to minimise the risk of wildlife strikes, as well as habitat management.

4.3. Predicted Future Changes in Passenger and Cargo Throughput at Gatwick

4.3.1 During 2019, Gatwick Airport accommodated the following:

- total passengers: 46.6 million;
- commercial air traffic movements: 283,000; and
- total cargo: 150,000 tonnes.

4.3.2 The COVID-19 pandemic had a very severe impact on the global aviation industry in 2020. Gatwick, along with all other UK airports, experienced a significant reduction in passenger traffic levels as a result of both Government-imposed restrictions on air travel and reduced passenger demand driven by low consumer confidence. UK passenger volumes for the calendar year 2020 were 75% down on volumes for 2019. It is expected that Government travel restrictions will continue to have an impact on passenger demand and traffic levels throughout 2021, but that by the end of 2021 traffic levels will start to recover.

4.3.3 While the immediate outlook therefore remains challenging, there is confidence that passenger and airline demand at Gatwick will return to previous levels over the course of the next few years and then continue to grow thereafter.

4.3.4 Overall, the updated forecasts provided by ICF predict that it will take approximately five years for commercial traffic at Gatwick to return to levels seen in 2019 and that by the end of the 2020s, commercial levels at Gatwick will have returned broadly to where they would have been had the pandemic not occurred. This reflects the combination of ongoing capacity constraints already experienced before and during 2019 and underlying market growth across the London system. For example, Gatwick has been operating very close to its full potential in the peak summer months for several years. Gatwick's slot capacity has been oversubscribed for many years with significant levels of unmet demand from a range of airlines and business models.

4.3.5 As set out in Chapter 1, it is predicted that by 2038, passenger throughput would increase to approximately 62.4 million passengers per annum (mppa) in the absence of the Project. Three main factors influence the predicted change in future passenger numbers, as follows.

- Growth in runway utilisation in off-peak periods: whilst GAL is anticipating only minor changes in the number of daily aircraft movements during current peak summer months (July to September), during the off-peak periods – the shoulder months of summer (April to June and October) and in the winter months (November to March) – the number of daily aircraft movements is expected to increase by a greater amount than in the peak months.
- Up-gauging of aircraft fleets with larger aircraft: reflecting the trend for airlines to replace their fleets with larger aircraft having more seats.
- Increased load factors: an increase in the average occupancy levels of flights.

4.3.6 In order to support this growth, a number of developments are required at the airport in the absence of the Project. Details of these future baseline developments are provided in Sections 4.4 to 0.

4.3.7 Further details can be found within the Forecast Data Book provided at Appendix 4.3.1. Forecasts are provided for the following assessment years.

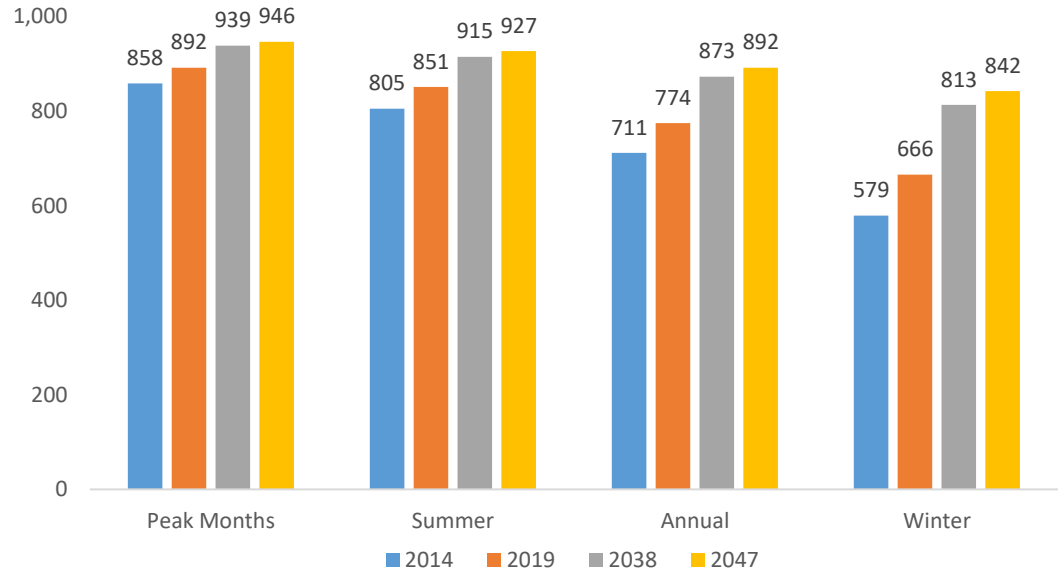
- 2029: represents the opening year of the Project (and therefore the first point at which effects arising from its operation would occur).
- 2032: an interim assessment year.
- 2038: representing the year in which all development works proposed in the northern runway project would be completed.
- 2047: to meet a specific requirement of guidance in the Design Manual for Roads and Bridges to assess impacts 15 years after the last of the key highways works associated with the Project are due to be completed.

Growth in Runway Utilisation in Off Peak Periods

4.3.8 In the busy summer months (July, August and September), Gatwick is often already operating at, or close to, its peak capacity. In the Baseline Case GAL is anticipating only modest growth during this period as daily commercial ATMs are forecast to increase by 4% from an average of around 900 in 2019 to 939 in 2038 and to 946 in 2047.

4.3.9 For the total summer season (Apr-Oct), daily commercial ATMs are forecast to increase 7% from an average of 851 in 2019 to 915 in 2038 and to 927 in 2047. In contrast, the less utilised winter period is forecast to increase from an average of 666 in 2019 to 813 daily commercial ATMs in 2038 and to 842 by 2047. By 2038, this represents an increase of 22% versus 2019. By comparison, Gatwick's winter utilisation has increased by 15% in just the last 5 years as daily commercial ATMs have grown from 579 to 666.

Diagram 4.3.1: Gatwick Daily Movement Growth



Source: CAA Passenger ATM Statistics (See Appendix 4.3.1 Forecast Data Book)

4.3.10 The increase in runway utilisation during off peak periods will result in annual traffic profiles flattening as demand spreads to the less utilised periods of the year, although some seasonality

would remain. In 2038, busy month commercial ATMs are forecast to be 7% higher than the annual average compared to 17% in 2019 and 23% in 2014.

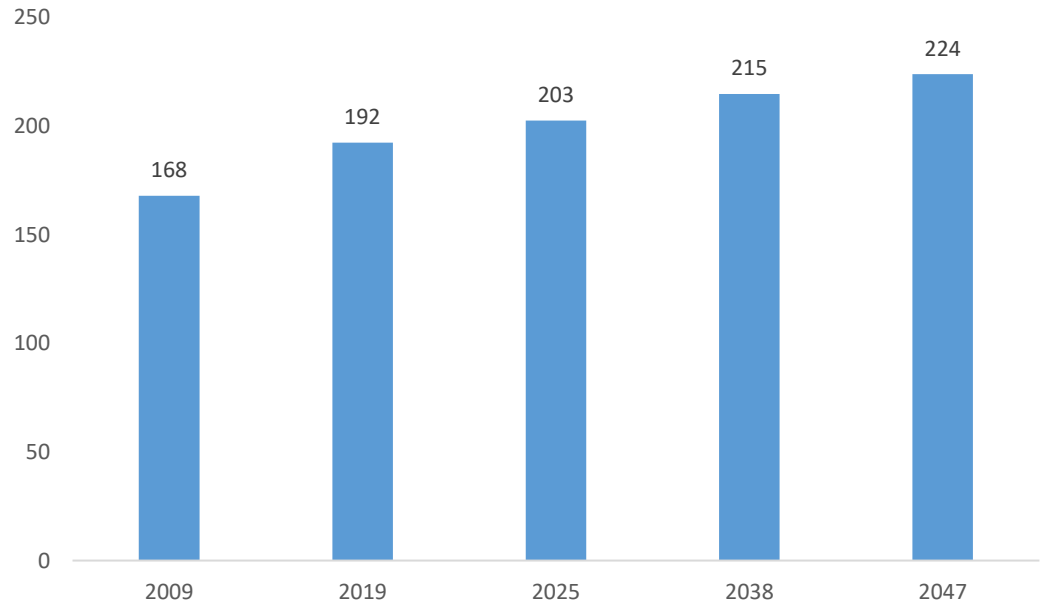
Up-gauging of Fleet Over Time to Larger Aircraft

4.3.11 The second important and year-round factor that would drive passenger growth is the trend for airlines to up-gauge their fleets with larger aircraft. Seats per ATM are expected to increase from an average of 192 in 2019 to 215 by 2038 (and 224 by 2047), as shown in Diagram 4.3.2 below.

4.3.12 Two good examples of this can be seen in Gatwick's top two airlines, easyJet and British Airways, which currently account for over 60% of Gatwick's passengers. It is noted that easyJet is moving towards A320 and A321 aircraft (with 186 seats and 235 seats respectively) from the current A319 (156 seats) and the A320 fleet (previously 180 seats). Similarly, British Airways is continuing to 'densify' its Boeing 777 fleet alongside longer term fleet replacement plans for their short haul fleet which would result in significant increases in average seats per aircraft.

4.3.13 New long haul markets and the use of Boeing 787s (often replacing the 757/767 models) and the Airbus A350 are other examples of airlines up-gauging.

Diagram 4.3.2: Average Seats per ATM



Source: CAA/GAL Statistics

4.3.14 The above changes are already underway for easyJet and British Airways and other large carriers such as Tui and it is realistic to assume this would continue, especially as new slot capacity at UK airports continues to become more scarce and the UK aviation market demand continues to grow.

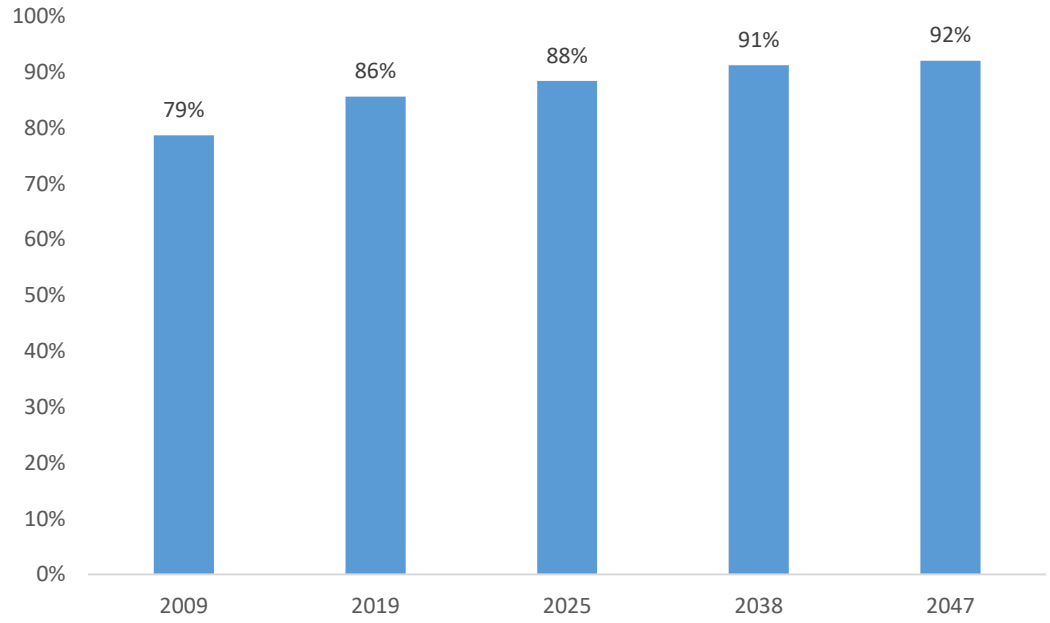
Higher Average Load Factors

4.3.15 Allied to the increase in average aircraft size is a predicted increase in average seat occupancy rates across the year, also referred to as load factors. In 2019, average load factors ranged between 78-92% (averaging 86%) across the year and have increased from 79% to 86% over the

previous ten years. This increase has been supported by the growth of low cost carriers who have been actively increasing load factors across their networks.

4.3.16 Over the next 20 years, load factors are forecast to increase at a slower rate with the gains seen in the last ten years not being repeated in the next 15-20 years. Factors such as seasonality, directional imbalances and no shows would continue to present challenges for airlines to increase their seat occupancy rates further. By 2038, and beyond, average load factors are forecast to increase to just over 90%, which is comparable to Gatwick's most efficient carriers operating today (see Diagram 4.3.3).

Diagram 4.3.3: Average Load Factor



Source: CAA/GAL Statistics

4.3.17 When combined, the aircraft size and load factor assumptions would result in the average number of passengers per flight increasing from 165 in 2019 to 196 in 2038 (and 206 in 2047).

Cargo

4.3.18 In addition to the changes in passenger numbers, cargo throughput is also predicted to increase. Based on the future predicted mix of aircraft types and the amount of cargo that is carried in the hold of passenger aircraft, it is predicted that cargo throughput would increase from approximately 150,000 tonnes in 2019 to approximately 254,000 tonnes in 2038 (and 290,000 tonnes in 2047).

4.4. Future Baseline

Future Baseline Airfield Projects

4.4.1 The developments outlined in this section are currently consented or under construction and would proceed in the absence of the Project. The capability of the existing airport, when the consented airfield and terminal projects are complete, would be 62.4 mppa by 2038 (and 67.2 by 2047).

4.4.2 As part of this programme of consented airport improvements, a western extension to Pier 6 is proposed. The Pier 6 extension will increase the number of pier-served stands from 11 stands to 17 (for this pier). As part of these works, limited changes to existing stands and alterations to Taxiway Quebec are required where these are located in the area of the proposed pier extension.

4.4.3 With the Pier 6 extension in place, the number of stands would be as follows:

Table 4.4.1: Aircraft Parking Stands

Aircraft Type	Number of Stand Centrelines (Future Baseline)
Code C stands (North Terminal)	47
Code C stands (South Terminal)	38
Code C stands (remote)	45
Code E stands (North Terminal)	17
Code E stands (South Terminal)	16
Code E stands (remote)	27
Code F stands (North Terminal)	1

Note: Number represents the number of stand centrelines, different configurations are available.

4.4.4 In addition, the normal or planned maintenance and asset replacement programme for the main runway will include:

- resurfacing of the main runway in accordance with the usual maintenance schedule; and
- replacement of the ILS equipment.

4.4.5 GAL also has plans under an existing consent to bring forward an additional rapid exit taxiway from the main runway.

Future Baseline: Car Parking

4.4.6 A number of new car parks are planned for implementation in the absence of the Project. These include the following:

- multi-storey car park 4 (South Terminal): 1,500 spaces;
- multi-storey car park 7 (North Terminal): 2,750 additional spaces; and
- use of robotics technology within existing long stay parking areas to increase capacity, resulting in an additional 2,500 spaces.

Future Baseline: Highway Improvements

4.4.7 Highway improvements proposed in the absence of the Project include local widening on the junction entry/exit lanes for both the North Terminal and South Terminal roundabouts, together with signalisation of the roundabouts and provision of enhanced signage.

Future Baseline: Projects Undertaken by Others

4.4.8 A number of facilities are planned for implementation in the absence of the Project, including:

- extension to the existing BLOC hotel (approximately 200 additional bedrooms); and
- reconfiguration of the existing Hilton hotel to provide 50 additional bedrooms.

4.4.9 Improvements to Gatwick Railway Station were the subject of a separate consenting process, with consent granted in March 2019 for a series of improvements to almost double the size of the station concourse, provide additional lifts and escalators and improve access to the platforms. The enhancement to the railway station will improve passenger experience and provide capacity for further growth in the numbers of rail passengers and overall public transport mode share. These improvements commenced in 2020 and will be in place prior to operation of the Project.

4.5. Airspace Management

FASI South

4.5.1 Airspace within the UK is regulated by the Civil Aviation Authority (CAA) and managed by NATS En Route (NERL), which is a subdivision within the National Air Traffic Services (NATS).

4.5.2 Work is being undertaken to review the airspace over London and the south east of England, with the aim of addressing existing constraints and allowing for future growth in air transport. This work is being undertaken by NATS, in partnership with the Department for Transport and the CAA and is known as the Future Airspace Strategy Implementation (FASI) South.

4.5.3 FASI South will be developed through an airspace change consultation in line with the CAA's airspace change process document (CAP1616 (CAA, 2021)) and will in due course be subject to its own assessment process. This process for the airspace around Gatwick Airport below 7,000 feet has just re-started (July 2021) but it will be some years before the outcome is clear. However, FASI South is not required in order to allow dual runway operations at Gatwick. The Environmental Impact Assessment (EIA) process for this Project has therefore been undertaken based on current flightpath information, updated to reflect the movement of the centreline of Gatwick's northern runway by 12 metres.

4.5.4 Although the proposed FASI South airspace changes lie outside of the scope of this Project, should information on the outcome of the FASI South process become available during the course of the EIA process for the Project (at a time when the information can be taken into account prior to submission), the implications of this, in terms of amended noise impacts, will be reviewed and considered within the EIA process.

Airspace Change due to the Project

4.5.5 In order to ascertain whether an airspace change is required to enable dual runway operations at Gatwick (with the realignment to the centreline of the northern runway), GAL submitted a Statement of Need within the scope of CAP 1616 to the CAA on 11 November 2019. The CAA issued CAP 1908 in May 2020, assigning the airspace change as Level 0[5] as the proposal would not alter traffic patterns (CAA, 2020). In December 2020, the CAA issued its decision (Decide Gateway): '*The CAA has completed the Decide Gateway Assessment and is satisfied that the change sponsor has met the requirements of the Airspace Change Process. The CAA approves the implementation of this airspace change proposal.*' CAP 1908 notes that all physical works associated with the Northern Runway Project would be considered through the DCO consenting process.

[5] Level 0: Changes to nomenclature or qualifying remarks of notified airspace design that will not later air traffic patterns. Change sponsors are required only to complete Stage 1A of the airspace change process. Stage 1A is the first step in a 7 stage process for airspace change. This process is defined in CAP1616 (CAA, 2021).

4.6. Summary of Key Parameters

4.6.1 Table 4.6.1 provides a summary of the key parameters of the existing site and the future baseline (without the Project). Further detail is provided in Appendix 4.3.1.

Table 4.6.1: Summary of Key Parameters

Element	Key Parameter
Existing Gatwick Airport land ownership	747 hectares
Existing airport passenger throughput (2019)	46.6 mppa
Predicted future baseline airport passenger throughput (2038)	62.4 mppa
Approximate existing commercial air traffic movements (2019)	283,000
Approximate existing non-commercial air traffic movements (2019)	2,000
Approximate existing total aircraft movements (2019)	285,000
Approximate future commercial air traffic movements (2038)	318,000
Approximate future non-commercial air traffic movements (2038)	2,000
Approximate future total aircraft movements (2038)	321,000
Utilisation of existing northern runway (number air traffic movements - 2019)	2,842
Existing cargo (2019)	150,000 tonnes
Predicted future cargo (2038)	254,000 tonnes
Existing number of piers	6
Number of piers (with Pier 6 extension)	6 (with extension to existing Pier 6)
Approx. existing ‘on airport’ short term and long term car parking	40,611 spaces
Approx. existing ‘on airport’ staff car parking	6,090 spaces
Approx. total existing ‘on airport’ parking	46,701 spaces
Predicted approx. future airport car parking (with future baseline car parking improvements)	53,451 spaces
Existing terminal floorspace: North Terminal	98,100 m^2
Existing terminal floorspace: South Terminal	119,300 m^2
Maximum height of existing terminal building: North Terminal	32 metres
Maximum height of existing terminal building: South Terminal	40 metres
Existing hotel rooms	3,000
Predicted future baseline hotel bed spaces (with future baseline projects)	3,250 (additional 250 beds)
Existing office floor space (in main office buildings)	34,590 m^2
Future baseline office floor space	34,590 m^2 (no change)

4.7. References

Civil Aviation Authority (2020) Gatwick Airport Northern Runway Project Airspace Change Assigned Level Decision: CAP 1908. Available at: https://airspacechange.caa.co.uk/PublicProposalArea?pID=205

Civil Aviation Authority (2021) Airspace Change: CAP 1616. Available at: https://publicapps.caa.co.uk/docs/33/CAA_Airspace%20Change%20Doc_Mar2021.pdf

ICAO (2017) Aerodrome Reference Code [online] https://www.skybrary.aero/index.php/ICAO_Aerodrome_Reference_Code. Accessed October 2019.

4.8. Glossary

Table 4.8.1: Glossary of Terms

Term	Description
ATM	Air Traffic Movements
CAA	Civil Aviation Authority
CARE	Central Area Recycling Enclosure
DCO	Development Consent Order
EIA	Environmental Impact Assessment
FASI	Future Airspace Strategy Implementation
GAL	Gatwick Airport Limited
ICAO	International Civil Aviation Organization
ILS	Instrument Landing System
ITTS	Inter-Terminal Transit System
mppa	million passengers per annum
NATS	National Air Traffic Services
PEIR	Preliminary Environmental Information Report

Preliminary Environmental Information Report
Chapter 5: Project Description

September 2021

Table of Contents

5 Project Description

5.1. Introduction

5.1.1 This chapter provides a description of the Project and forms the basis for the environmental assessment provided in this Preliminary Environmental Information Report (PEIR). Further information can be found in the appendices to this chapter provided in Volume 3 of this PEIR.

5.1.2 The effects of the Project have been assessed throughout the PEIR based on what is likely. Where options remain, the limits of the assessment have been set sufficiently wide to allow a robust assessment to be undertaken of a reasonable worst-case scenario. A number of measures which would reduce or avoid adverse environmental effects arising have been included as part of the Project design. Details of these measures are provided in this chapter and set out in each topic chapter.

5.2. Overview of the Project

Key Components of the Project

5.2.1 The Project proposes alterations to the existing northern runway which, along with lifting the current restrictions on its use, would enable dual runway operations. Together with the alterations to the northern runway, the Project would include the development of a range of infrastructure and facilities to allow increased airport passenger numbers and aircraft operations and to allow Gatwick Airport to make best use of its existing runways.

5.2.2 The Project would include alterations to the existing northern runway and corresponding enhancements to the taxiway system and parking stands to accommodate an increase in aircraft movements. Other elements of the Project would enable the increased airfield capacity to be accessed by passengers through additional processing capability and improved airport access. Land would be provided to mitigate environmental effects (for example, for habitat creation, flood compensation or provision of recreational routes).

5.2.3 The Project includes the following key components:

- amendments to the existing northern runway including repositioning its centreline 12 metres further north to enable dual runway operations;
- reconfiguration of taxiways;
- pier and stand alterations (including a proposed new pier);
- reconfiguration of other airfield facilities;
- extensions to the existing airport terminals (north and south);
- provision of additional hotel and office space;
- provision of reconfigured car parking, including new car parks;
- surface access (including highway) improvements;
- reconfiguration of existing utilities, including surface water, foul drainage and power; and
- landscape/ecological planting and environmental mitigation.

5.2.4 The land subject to the application for development consent extends to approximately 820 hectares, of which approximately 747 hectares lies within the ownership of Gatwick Airport

Limited (GAL). The Project site boundary is shown on Figure 1.2.1. The key elements of the Project are shown on Figure 5.2.1 (sheets a – h) inclusive as follows:

- Figure 5.2.1a: Proposed Airfield/Airport Works;
- Figure 5.2.1b: Proposed Car Parks;
- Figure 5.2.1c: Proposed Hotels and Commercial Elements;
- Figure 5.2.1d: Proposed Surface Access Improvements;
- Figure 5.2.1e: Proposed Surface Water and Foul Water Improvements;
- Figure 5.2.1f: Proposed Principal Construction Compounds;
- Figure 5.2.1g: Potential Environmental Mitigation and Enhancement Areas; and
- Figure 5.2.1h: Existing Facilities to be Demolished or Removed.

5.2.5 Further details of the key components are provided below. Indicative details of the proposed highway improvements are provided in Appendix 5.2.1.

Changes to Enable Dual Runway Operations

5.2.6 Once operational, the Project would generally result in:

- all arriving aircraft using the existing main runway during normal operations;
- shared departures between the existing main runway and the northern runway (with smaller aircraft using the northern runway); and
- controlled dependency between the two runways to enable safe operations, including crossing of the northern runway by arriving aircraft[1].

5.2.7 The northern runway may be used for both arrivals and departures in circumstances when the main runway is closed, for example during periods of maintenance, in line with current practice.

5.2.8 It is anticipated that by 2038 this could increase Gatwick's passenger throughput to approximately 75.6 million passengers per annum (mppa), compared to a maximum potential passenger throughput based on existing facilities (with future baseline projects) of 62.4 mppa. This represents an anticipated increase in capacity of approximately 13.2 mppa (see Chapter 4: Existing Site and Operation for further details).

Alterations to the Existing Northern Runway

5.2.9 The existing northern runway is designated 08L/26R such that when the wind is from the east, aircraft approaching the runway operate on a heading of 80°, while when the wind is from the west, aircraft operate on a heading of 260° (see Chapter 4: Existing Site and Operation for further details). The runway is currently a non-instrument runway[2], measuring approximately 2.6 km in length and a minimum of 45 metres in width, plus runway shoulders.

5.2.10 The existing northern runway would be adjusted to reposition the centreline 12 metres further north to ensure a separation distance of 210 metres between it and the main runway. This distance is required to meet European Aviation Safety Agency standards for closely spaced

[1] Controlled dependency: to ensure the safety of aircraft operations, an arrival from the main runway would slow or stop short of the northern runway and cross it only after a departure on the northern runway has completed.
[2] A non-instrument runway is one where the pilot is reliant on visual cues (approach and runway lighting, approach path indicators, and paint markings) to make a safe approach and landing to the airport. If the visual cues are not visible to the pilot owing, for example, to fog on the runway or a very low cloud base, then the aircraft may have to hold until conditions improve, or divert to an alternate airport. A non-instrument runway is not equipped with an Instrument Landing System.

parallel runways. The altered northern runway would retain a width of approximately 45 metres, with 7.5 metre wide shoulders.

5.2.11 The redundant 12 metre strip to the south of the altered northern runway would be removed. The 33 metre wide section of retained existing runway, together with the new 12 metre strip to the north, would be resurfaced and provided with new markings to form the altered northern runway. There would be no change to the overall length of the runway.

Reconfiguration of Taxiways

5.2.12 A number of existing taxiways would require amendment and realignment in order to accommodate the altered northern runway, to provide sufficient room for the safe manoeuvre of aircraft associated with both runways and to accommodate increased aircraft numbers. Redundant areas of hardstanding would be removed.

Taxiway Juliet

5.2.13 The existing Taxiway Juliet would require an increased separation distance from the northern runway in order to allow aircraft to use this taxiway independently of northern runway operations. The western part of Taxiway Juliet (Taxiway Juliet West) would be realigned approximately 27 metres to the north to allow for the movement of large (Code F) aircraft[3].

5.2.14 The eastern part of Taxiway Juliet (Taxiway Juliet East Code E) would be realigned approximately 19.5 metres to the north between Taxiways Uniform and Sierra. This would allow for the movement of Code E aircraft along this section of taxiway independently of northern runway operations.

5.2.15 The eastern part of Taxiway Juliet between Taxiways Sierra and Quebec (Taxiway Juliet East Code C) would be realigned by approximately 5 metres northwards to allow for the movement of Code C aircraft independently of northern runway operations.

5.2.16 In addition, a new spur (known as the Taxiway Juliet West Spur) would be provided to the north of the taxiway in order to provide a passing lane and allow air traffic control to effectively sequence aircraft for departure on the main and northern runways during easterly operations.

5.2.17 The realigned Taxiway Juliet and spur are shown in light blue on Figure 5.2.1a.

Taxiways Lima and Tango

5.2.18 Modifications to the existing Taxiways Lima and Tango are proposed in order to create independence in routing to and from the northern runway for large aircraft, while avoiding the need to move Taxiway Juliet 27 metres further north along its length.

5.2.19 Taxiway Lima would require an extension westward, towards the existing Taxiway Uniform, providing a route suitable for larger Code E and Code F aircraft. The extension would be 23 metres in width and approximately 300 metres in length. This would require some work to the pavement of the existing Taxiway Uniform.

[3] Details of aircraft categories are provided in Chapter 4: Existing Site and Operation.

5.2.20 An extension to Taxiway Tango would provide a cut-through northwards to meet the extended Taxiway Lima, creating a taxiway for Code E aircraft. The cut-through would be 23 metres in width and approximately 85 metres in length.

5.2.21 The amended Taxiways Lima and Tango are shown in light blue on Figure 5.2.1a.

Taxiways Whiskey, Victor and Zulu

5.2.22 Taxiways Whiskey, Victor and Zulu would require reconfiguration to accommodate Code E aircraft. This would largely be located within the area occupied by the existing taxiways but would require an additional area to the north of Taxiway Zulu to accommodate wider body aircraft. The amended taxiways are shown in light blue on Figure 5.2.1a.

Exit/Entrance Taxiways

5.2.23 Eight new runway exits/entrance taxiway connections would be provided between the northern runway and Taxiway Juliet as part of the Project in order to allow aircraft to move from the main and northern runways to Taxiway Juliet and to access the northern runway for departure. Two existing exit/entrance taxiway connections would be removed and one would be substantially modified.

5.2.24 Six new exit/entrance taxiways to/from the main runway would be required as part of the Project in order for aircraft to access and egress the runway, and to allow aircraft to be held before crossing the northern runway, under the direction of air traffic control. Six existing exit/entrances taxiways would be substantially removed and one existing exit/entrance would be retained unchanged. Once amended, seven exit/entrance taxiways would connect the main and northern runways (five would operate when the runway operates as 26R and two would operate when the runway operates as 08L) while an eighth taxiway would provide an exit from the main runway to the western end-around taxiway, described below.

5.2.25 On Figure 5.2.1a modified entrance/exit taxiways are shown in dark blue, existing entrance/exit taxiways are shown in black and new entrance/exit taxiways are shown in light green.

End Around Taxiways

5.2.26 Amendments are required to existing infrastructure in order to provide end around taxiways (at the end of both runways) to allow large aircraft to cross the end of the runway, under the direction of air traffic control. In addition, they would provide a resilient route for all aircraft in case of any issue preventing the use of exit taxiways.

5.2.27 These proposed end around taxiways would comprise the following:

- end around taxiway west: a new end around taxiway linking into the existing Taxiway Juliet to allow aircraft landing on the main runway to avoid affecting northern runway operations when aircraft are operating on a heading of 260°; and
- end around taxiway east (Yankee): a new exit taxiway would link into the existing Taxiway Yankee to form the end around taxiway east (Yankee). This would allow aircraft landing on the main runway to avoid affecting northern runway operations when aircraft are operating on a heading of 80°.

5.2.28 The amended new/amended end around taxiways are shown in dark green on Figure 5.2.1a.

Aircraft Holding Area

5.2.29 Reconfiguration of an existing apron area to the north of Taxiway Juliet is proposed. This would include reconfiguration of the existing stands (known as the 130s/140s stands). This new configuration is known as the Charlie box and would provide aircraft stands and operational aircraft hold points which allow aircraft to be held just prior to accessing the northern runway to optimise runway occupancy efficiency and remove aircraft from busy taxiways. The Charlie box would include new taxiways across the existing apron area, including:

- four routes for Code E aircraft linking Taxiway Kilo and the northern runway/Taxiway Alpha November;
- an east-west taxi route for Code C aircraft to allow independent access/egress from all positions; and
- two routes for Code C aircraft with a Code F taxi lane on Taxiway Kilo to link with taxiways Papa and Quebec and provide alternative routing for Code F aircraft to the runway.

5.2.30 The aircraft holding area/Charlie box would occupy an area of approximately 15 hectares and is shown in yellow on Figure 5.2.1a.

Pier and Stand Amendments

5.2.31 Gatwick Airport currently operates six piers (Piers 1, 2 and 3 at the South Terminal and Piers 4, 5 and 6 at the North Terminal). As part of already consented airport improvements, construction work on a western extension to Pier 6 is consented and construction commenced in 2019.

5.2.32 As part of the Project, a new Pier 7 is proposed to the north west of Pier 6, adjacent to the existing cargo facility. The new Pier 7 building is shown in dark blue on Figure 5.2.1a and would consist of a ground floor plus two levels (arrivals and departures), including inbound and outbound autonomous transport lobbies (at ground level), together with limited commercial facilities at the first floor level. Passengers would access the new pier via autonomous vehicles from new stations provided at the North and South Terminal buildings (see paragraphs 5.2.61 and 5.2.62). The pier would occupy an area of approximately 10.1 hectares (101,000 m^2), with a maximum building height of approximately 18 metres. The apron to the south of Pier 7 would provide new aircraft stands (14 Code C/9 Code E).

5.2.33 In addition to the new Pier 7, the Project would include the following amendments to stands to allow for increased flexibility in terms of handling of different aircraft types:

- provision of a new area of remote stands in the existing area to the north of Taxiway Juliet (in an area to be known as Oscar);
- reconfiguration of existing areas of remote stands to allow for the reconfigured Taxiway Lima while retaining stands suitable for Code C aircraft (stands 150-151);
- provision of additional intermediate hold stands (particularly within the proposed aircraft holding area/Charlie box);
- conversion of existing stands located to the west of Pier 3 to Code C fully serviced stands – providing overnight aircraft parking/remote stands;
- provision of one new Code C stand north east of the existing Virgin hangar;
- removal and reduction of existing stands to allow for relocation of Taxiway Juliet East; and
- Provision of 14 new stands north of Taxiway Lima.

5.2.34 Table 5.2.1 sets out the number of existing stands, together with the number of stands with the Project in place.

Table 5.2.1: Number of Existing and Proposed Stands

Type	Number of Stand Centrelines without Project (Future Baseline)	Number of Stand Centrelines with Project
Code C stands (North Terminal)	47	61
Code C stands (South Terminal)	38	38
Code C stands (remote)	45	74
Code E stands (North Terminal)	17	24
Code E stands (South Terminal)	16	16
Code E stands (remote)	27	17
Code F stands (North Terminal)	1	1

Note: Number represents the number of stand centrelines, different configurations are available.

Reconfiguration of Existing Airport Facilities

5.2.35 A number of existing facilities would require reconfiguration or relocation, and additional facilities would be required to accommodate the proposed changes to the airport. This would comprise construction of new facilities and demolition of existing facilities, including:

- central airfield maintenance and recycling facilities;
- cargo facilities;
- fire training ground and satellite airport fire service provision;
- hangars;
- provision of perimeter boundary treatments to mitigate noise (eg noise walls and bunding); and
- internal access routes and forecourts.

5.2.36 These are described further in turn below.

Central Airfield Maintenance and Recycling Facilities

Central Area Recycling Enclosure (CARE) Facilities

5.2.37 The existing CARE facility is located within an area of the existing airfield to the north of Taxiway Juliet. Facilities include the existing waste processing building, biomass boiler, compound area and bin store. This area would be repurposed to provide new remote stands and therefore the existing CARE facility would require demolition.

5.2.38 A replacement CARE facility is proposed in the north western part of the airport. The relocated CARE facility would process the majority of airport waste and is likely to include:

- a replacement/relocated biomass boiler to manage organic matter;
- an additional biomass boiler to manage organic matter;
- a materials recovery facility (MRF) to allow sorting of waste;
- card baling facilities;
- vehicle weigh in/weigh out platform;
- office accommodation and welfare facilities; and

- hard standing area for recycling storage, quarantine area and manoeuvring area for supplier collection vehicles and vehicle movements.

5.2.39 The proposed CARE building is likely to be up to 22 metres in height above ground level and could include elements up to 5 metres below ground level. The biomass boiler flue heights are likely to be up to 50 metres above ground level. The building would occupy an area of approximately 17,550 m^2.

5.2.40 Two possible locations for the CARE facility have been identified, both located in the north western part of the airport (shown in orange on Figure 5.2.1a). Option 1 would be located to the north of the cargo hall (north east of Pier 7), while Option 2 would be located to the north west of Pier 7.

Motor Transport Facilities

5.2.41 The existing Motor Transport facilities are also located to the north of Taxiway Juliet and are proposed to be demolished and re-provided to the north western part of the airport (shown in pale green on Figure 5.2.1a adjacent to Option 2 for the CARE facility).

5.2.42 The proposed replacement Motor Transport facility is likely to include a parts store, ramps, pits, tyre store, test area, workshop, heavy goods vehicle (HGV) refuelling area and vehicle wash area. The building(s) and compound would occupy an area of approximately 15,600 m^2, with a maximum building height of 15 metres above ground level and could include elements up to 5 metres below ground level.

Grounds Maintenance Facilities

5.2.43 The existing grounds maintenance facilities would also be demolished and re-provided in an area of hardstanding in the south eastern part of the airport (shown in pale green on Figure 5.2.1a). New buildings would include an open vehicle storage shed, closed tool shed, hazardous substances unit and a portacabin style office/welfare area. A yard would be required with sufficient space to park and turn vehicles, together with a green waste composting area. The building would be approximately 1,230 m^2 in area with a maximum height of 8 metres.

Airfield Surface Transport Facilities

5.2.44 The existing Surface Transport facility would be demolished and re-provided in an area of hardstanding in the south eastern part of the airport, adjacent to the grounds maintenance facilities. New buildings would include open storage and vehicle sheds and a grit and salt store, together with a parking area. This would be located within an area of approximately 1,440 m^2 with a maximum building height of 15 metres and could include elements up to 5 metres below ground level.

Emergency Air Traffic Control Tower and Rendezvous Point North

5.2.45 The emergency air traffic control tower is currently located south of the existing Virgin hangar and to the west of the surface transport and grounds maintenance facility. This tower is proposed for demolition.

5.2.46 Due to the reconfiguration of this area, the existing Rendezvous Point North would require relocation in order to re-provide a suitable emergency rendezvous area, to the north of the central

airport area, for off-airport emergency services. The relocated Rendezvous Point North is shown in dark green on Figure 5.2.1a.

Cargo

5.2.47 The existing cargo facility occupies an area of approximately 10 hectares, including 23,000 m^2 of cargo sheds, with office accommodation and areas for HGV loading, unloading and parking. It currently includes non-cargo activities and is not therefore currently used to its full potential.

5.2.48 The cargo facility has capacity to accommodate the existing throughput and the increased cargo throughput that the Project is forecast to generate, although some internal operational changes within the facility are proposed . These would not require changes to the external appearance, height or floor area of any existing buildings or structures, although replacement pavement will be provided.

Aircraft Engine Ground Running

5.2.49 Aircraft engine ground running for test and maintenance purposes is currently facilitated in a number of locations on existing taxiway infrastructure (see Chapter 4: Existing Site and Operation), some of which would be affected by the reconfigured airfield facilities forming part of the Project. Amended locations for engine ground running are proposed on Taxiway Juliet close to the current areas.

Fire Training Ground

5.2.50 The Project requires the relocation of the existing fire training ground in order to allow for the reconfigured Taxiway Juliet (and spur). The fire training ground currently occupies an area of approximately 13,050 m^2 in the western part of the airfield, to the north of the existing northern runway, and includes a fire training rig, control centre, compartment fire training complex, road traffic collision mock-up area, classrooms, underground water storage, water tower and deluge system. The facility allows for rescue and firefighting training to ensure maintenance of competency and skills for GAL's own rescue and firefighting service.

5.2.51 It is proposed that the fire training ground be re-provided to the north of its existing location (shown in red on Figure 5.2.1a), occupying a consolidated area of approximately 12,000 m^2. The existing rig would be relocated, the height of which would be no greater than 25 metres, with tank depths of up to 5 metres.

Satellite Airport Fire Service Provision

5.2.52 Dependent on safety case requirements, the Project may require a satellite Airport Fire Service facility to the south of the main runway in order to meet aerodrome certification requirements, including response time to incidents. The facility would be located within an area of up to 8,000 m^2, with a maximum built height of 15 metres. The location is shown in yellow on Figure 5.2.1a.

Hangars

5.2.53 A hangar has recently been constructed by Boeing in the north west part of the airport (completed autumn 2019). It is anticipated that one additional hangar, sized for Code E aircraft, would be required as part of the Project. This is also proposed to be located in the north western part of the

airport, to the north of Larkins Road. The hangar would have a footprint of approximately 12,440 m^2 and would be up to 32 metres high.

5.2.54 In addition, the existing Virgin hangar in the north west part of the airport would be converted to an airside operation. This would require relocation of existing infrastructure from the north side of the existing hangar. Like-for-like facilities would be provided. In addition, the extent of the existing pavement on the northern side of the Virgin hangar would be re-provided on the southern side.

Perimeter Boundary Treatments to Mitigate Noise

5.2.55 The Project would remove an existing bund in the western end of the airfield which attenuates noise from taxiing aircraft to external areas. The functionality of the bund would be re-provided in the proposed design, potentially in the form of a new bund or barrier in this area. The approximate location for this is shown on Figure 5.2.1g.

Internal Access Routes

5.2.56 The existing Larkins Road within the airport boundary would require realignment to accommodate the extension to Taxiway Lima. The realigned route would remain within the existing airport boundary.

5.2.57 An airside route for autonomous vehicles would be provided to allow travel between the new Pier 7 and the terminal buildings.

5.2.58 A new east-west access track is proposed between the main runway and the altered northern runway, suitable for use by light vehicles in order to allow aerodrome inspections and for other management/maintenance purposes. This would take the form of asphalt pavement or similar.

5.2.59 In addition, existing exit lanes from the secure airside area may require reconfiguration to allow vehicular entry, in order to ensure that there are sufficient vehicle entry points from landside to airside.

Extensions to North and South Terminals

5.2.60 Extensions to the existing North and South Terminals would be required to accommodate passenger growth. In addition, a number of internal changes are proposed within the terminals to allow for changes in technology and innovative approaches to passenger experience and baggage handling, together with changes to the terminal forecourts. The main external extensions are shown in dark blue on Figure 5.2.1a.

North Terminal

5.2.61 Works to the North Terminal would include the following.

- Extensions to the International Departure Lounge (IDL), to both the north and south of the current facility. The northern expansion would occupy a footprint of approximately 3,120 m^2 and result in additional floorspace of approximately 9,000 m^2 over Levels 20, 30 and 40 to provide a mix of retail, catering and general circulation space. The extension would be up to approximately 32.5 metres in height (above ground level). The southern extension would occupy a footprint of approximately 3,180 m^2, resulting in additional floorspace of approximately 10,000 m^2 over Levels 10, 20 and 30 and provide a mix of catering, retail and

general circulation space. The extension would be up to approximately 27 metres in height (above ground level).
- An extension to the baggage hall (providing baggage handling facilities), occupying a footprint and floorspace of approximately 6,552 m^2. The extension would be up to approximately 12.5 metres in height (above ground level).
- An extension to baggage reclaim with a footprint of approximately 650 m^2. The extension would be up to approximately 7 metres in height (above ground level).
- Internal reconfiguration works to facilities such as check in zones, baggage systems and security.
- Provision of a two-storey transition space to allow passengers to connect to a new autonomous vehicle facility, providing connections to the new Pier 7.

South Terminal

5.2.62 Works to the South Terminal would include the following.

- An extension to the IDL, occupying a footprint of approximately 3,780 m^2 and resulting in additional floorspace of approximately 15,000 m^2 over Levels 10, 20, 30 and 40 to provide a mix of retail, catering and general circulation space. The extension would be up to approximately 30.5 metres in height (above ground level).
- Internal reconfiguration works to facilities such as check in zones, baggage systems and security.
- Provision of a two-storey transition space to allow passengers to connect to a new autonomous vehicle facility, providing connections to the new Pier 7.
- Coaching gates to service remote stands.

Forecourts

5.2.63 North Terminal Forecourt comprises North Terminal Approach, Furlong Way, Racecourse Way, Arrivals Road, Departures Road, Coach Road and Northway. These links provide access to the terminal frontage, drop off areas, bus and coach stands, car rental facilities, short stay car park entrances and taxi ranks. Departures Road includes a restricted access link to the Upper Forecourt for premium drop off (limited to certain airlines only). Long stay car parking at North Terminal is accessed via Longbridge Way as a separate access off North Terminal roundabout.

5.2.64 South Terminal Forecourt comprises Ring Road South, Eastway, Westway, Coach Road, Upper Forecourt, Lower Forecourt and Ring Road North. These links provide access to the terminal frontage, drop off areas, bus and coach stands, car rental facilities, long stay and short stay car park entrances and taxi ranks. Upper Forecourt has restricted access and is used for airport taxis, car park shuttle buses and the electric hire car fleet.

5.2.65 The forecourts and approaches to both existing terminals would be enhanced, with routes providing access to the terminal frontage, multi-storey and long stay car parks, hotels and pick-up and drop-off areas for different transport modes. The way in which access is managed for different modes may change in order to optimise the use of available capacity. The broad locations of the forecourt works are shown on Figure 5.2.1d.

Hotel and Commercial Facilities

5.2.66 An increase in passenger and aircraft operations will require additional office and hotel provision to meet the needs of airport companies and passengers (see Figure 5.2.1c).

Offices

5.2.67 In recent years passenger growth has occurred without the need for additional office provision. However, it is expected that further operational office provision would be required as the airport grows to meet needs of airport companies. The Project therefore makes provision for new office accommodation in the location of the existing car park H. The space allocated could provide for up to three new office blocks, each office building having a footprint of approximately 1,024 m^2. These would be up to approximately 27 metres high (above ground level). The new offices would provide approximately 9,000 m^2 of floor space. The exact configuration, phasing and amount of floorspace would depend on the actual timing of requirements.

Hotels

5.2.68 There is significant hotel provision both on and off airport that serves the airport. Hotels on the airport tend to be used substantially (but not exclusively) by airport passengers and staff, whereas hotels further from the airport are supported by airport demand, but also meet other needs, such as tourism, leisure and business stays. Additional hotel provision is proposed on airport as follows:

- one new South Terminal hotel (up to 400 bedrooms) in the location of existing car park H (up to 27 metres in height);
- one new North Terminal hotel (up to 400 bedrooms) in the location of existing car park Y (up to 27 metres in height); and
- one new hotel at the building compound adjacent to the car rental site (200 bedrooms) (up to 16.3 metres in height).

5.2.69 In addition to the above, a number of facilities are proposed/consented for implementation in the absence of the Project to serve the projected increase in passenger numbers, including:

- extension to the existing BLOC hotel (approximately 200 bedrooms); and
- reconfiguration of the existing Hilton hotel to provide 50 additional bedrooms.

Car Parking

5.2.70 A range of on-airport car parking is currently provided as set out in Chapter 4: Existing Site and Operation. In addition to the existing provision, three new car parks are proposed for implementation in the absence of the Project to serve the projected increase in passenger numbers. Proposed improvements would take the future baseline car parking provision to 53,451 spaces in the absence of the Project.

5.2.71 New car parking would be required on site in order to meet additional demand generated by the proposed increase in passengers due to the Project, and to replace existing parking spaces that would be lost due to development associated with the Project. The plans also take into account an anticipated reduction in the number of spaces currently provided in unauthorised car parking sites away from the airport, which would be replaced by additional provision at the airport in line with Crawley Borough Council local plan policy[4]. Table 5.2.2 sets out the proposed car parking provision as part of the Project (see Figure 5.2.1b).

[4] It is anticipated that unauthorised off-airport parking would be reduced to 3,000 spaces

5.2.72 In addition, an area in the western part of Crawter's Field may be required for surface parking to replace part of the existing 'Purple Parking' (operated by a third party), which would be lost to make way for the end around taxiway. If required, this would be replacement rather than new parking provision.

5.2.73 The overall net increase in passenger car parking spaces would be approximately 18,500 (in addition to the existing parking provision of 53,451).

Table 5.2.2: Proposed Additional Passenger Car Parking

Type	Footprint (hectares)	Maximum Height (above ground level)	Estimated Spaces
North Terminal Long Stay (decked parking)	13.0	11 metres	4,500
Car park J multi-storey	1.0	27 metres	900
Car park Y multi-storey	1.9	27 metres	3,000
Car park H multi-storey	0.5	27 metres	1,800
Pentagon Field (decked parking)	8.8	8 metres[5]	5,800
Car parks X and V (decked parking)	6.9	7 metres	2,500
Total	**32**		**18,500**

5.2.74 No additional car parking for airport staff is proposed. Historically, Gatwick provided around 7,200 spaces for staff. However, as staff car mode share has decreased, GAL has taken steps to reduce this by over 1,000 spaces in the last five years. GAL is currently reviewing the optimum allocation of spaces and location for these staff spaces, taking into account an increase in staff numbers and changing work patterns but alongside promoting use of more sustainable travel to work, including car sharing. Overall, and even allowing for a larger workforce, it is proposed to reduce the total number of spaces provided per 1,000 employees across the airport.

Surface Access Improvements

5.2.75 In order to accommodate the proposed increase in passenger numbers accessing the airport, and taking into account other known and planned developments in the area, improvements are required to the highways that serve both the South Terminal and North Terminal roundabouts to add capacity. The designs and details of any improvements will be subject to road traffic assessment and detailed engagement with highway authorities, including Highways England. The designs currently under consideration within this PEIR are set out at Appendix 5.2.1.

5.2.76 The locations where an increase in road traffic volumes is likely to be greatest are at the South Terminal and North Terminal junctions.

5.2.77 In order to accommodate the proposed increase in passenger numbers, the following surface access improvements form part of the Project:

- South Terminal: new junction, providing full grade separation;
- North Terminal: new junction layout including some grade-separation, improving traffic flow and removing westbound traffic between Airport Way and the A23 from using the North Terminal roundabout;

[5] See section on cut/fill (paragraph 5.3.1085.3.107) – ground height at Pentagon Field will be raised as part of the cut/fill strategy.

- enhancement of the eastbound M23 Gatwick Spur as part of the South Terminal roundabout improvements, should these not be completed in advance of the airport expansion; and
- improvements to Longbridge Roundabout where the A23 meets the A217.

5.2.78 There would be continuous operation of the existing roads/junctions during construction of these improvements, although there would be periods where capacity would be reduced (either through narrow lane running or lane closures).

South Terminal Junction Improvements

5.2.79 The South Terminal roundabout (also known as the Welcome Roundabout) is the sole entry point into the South Terminal area and for local access roads, including the terminal forecourt, long stay car parks and commercial premises. It is served by the M23 Gatwick Spur to the east (leading from the M23 Junction 9) and Airport Way from the west (leading from North Terminal roundabout). The majority of Gatwick traffic accesses the airport from the M23 and traffic for both North Terminal and South Terminal must pass through this roundabout.

5.2.80 The westbound M23 Spur was upgraded as part of the Highways England M23 Smart Motorway Project, completed in Summer 2020. As part of that work, the hard shoulder of the westbound carriageway became a permanent running lane, providing a total of three lanes approaching the airport. Further local improvements, involving signalisation and minor widening of entries/exits, are proposed in the absence of the Project. The eastbound M23 Gatwick Spur was not widened at the time of the westbound works.

5.2.81 A description of the proposed works to the South Terminal roundabout required as part of the Project is provided in the paragraphs below.

5.2.82 The M23 Gatwick Spur/Airport Way carriageway would be raised, creating a flyover above the existing roundabout. The elevated M23 Gatwick Spur/Airport Way would provide clear headroom of 5.7 metres above the roundabout meaning that the road surface of the flyover would be approximately 8 metres above the existing ground level after allowing for deck construction and surfacing. The length of the flyover structure would be approximately 130 metres. Earthworks would support the approach to the bridge and reinforced earth-walls or retaining walls would be required between the mainline and slip roads.

5.2.83 To the west of the roundabout, the main carriageway would tie into the existing alignment before the bridge over the Brighton-London mainline railway. To the east, the main carriageway and slip roads to/from the roundabout would tie into the existing carriageway approximately 160 metres east of the existing bridge over the B2036 Balcombe Road, raising the existing road over the bridge approximately 2.2 metres as a result. This would require substantial widening and strengthening of this bridge, and possibly a full replacement. If not already undertaken as part of short-term improvements, it would also be necessary to widen the eastbound M23 Gatwick Spur to three lanes, to match the westbound spur road improvements completed as part of the M23 Smart Motorway Project.

5.2.84 The adopted Reigate and Banstead Local Plan Development Management Plan (2019) includes a site allocation for Horley Strategic Business Park (Policy HOR9) on 31 hectares of land to the north of Airport Way. This development would require a new dedicated, direct access onto the strategic road network (M23 Gatwick Spur) via an additional link off South Terminal roundabout and would generate additional road traffic that would need to be accommodated. Both the short-

term signalisation improvements and the grade-separation scheme would be capable of accommodating an additional entry/exit link to the roundabout in this location.

5.2.85 The M23 Gatwick Spur over the B2036 Balcombe Road would be raised by up to 2.2 metres. Balcombe Road overbridge would require strengthening or replacement, as well as widening to accommodate slip roads.

5.2.86 The works at the South Terminal Junction would include the provision of a noise barrier. The barrier (approximately 600 metres in length and up to 1 metre in height) would be located along the elevated section of highway.

North Terminal Junction Improvements

5.2.87 The North Terminal roundabout is the entry point to the North Terminal and local access roads, including the northern and east perimeter roads. The existing layout consists of a circular five-arm at-grade roundabout to the north east of the North Terminal, to the south west of the A23. There is currently no direct entry to the roundabout southbound from Horley and no direct exit from the roundabout on to the A23 southbound towards Crawley. Local improvements are proposed in the absence of the Project (see Chapter 4: Existing Site and Operation).

5.2.88 In order to provide for the predicted growth in passengers associated with the Project, a grade-separated junction design is required. The outline concept for this junction is to replace the existing roundabout with a signalised junction arrangement. This would provide extra capacity for movements to and from the airport and would separate airport and non-airport traffic, reducing conflict in peak periods, thereby reducing congestion. As part of this solution, an elevated flyover would be built to carry traffic between Airport Way (from South Terminal and the M23) and the A23 towards Horley. Additional improvements would be made to Gatwick Way to accommodate an increase in traffic flow towards Northgate Road.

5.2.89 The new junction would include a new signalised intersection on the A23 to facilitate a direct movement from the airport to the southbound A23 towards Crawley, relieving a current constraint. Traffic between Airport Way and Longbridge Way, for access to North Terminal long stay car parks would be re-routed via Gatwick Road to avoid conflicts with traffic accessing or egressing the North Terminal forecourt area and short stay car parks. The permanent layout of the new junction would not require additional land to accommodate running lanes, except in respect of the elevated link from Airport Way to the A23 northbound. Traffic between Horley and the M23 at Junction 9 and between Horley and Crawley along the A23 would not need to pass through the new airport access junction in either direction. The elevated link from Airport Way towards Horley would sit approximately 8 metres above the new junction to provide the required clearances as stipulated by Highways England's safety and design standards.

5.2.90 The flyover structure is anticipated to require three separate spans to cross at-grade carriageways and is expected to comprise a typical steel beam superstructure with a concrete slab deck on concrete abutments and piers, with piled foundations. The overall structure would be approximately 200 meters long. Retaining walls would be required to separate adjacent links at different levels or gradients.

5.2.91 The works at the North Terminal Junction would include the provision of two noise barriers. The first barrier (approximately 800 metres in length and up to 1 metre in height) would be located along the elevated central section of highway, while the second (approximately 900 metres in

length and up to 2 metres in height) would be located on a section adjacent to Riverside Garden Park.

Longbridge Roundabout Improvements

5.2.92 Works are also required to the Longbridge roundabout, including alterations to the existing layout. Options have been considered in relation to operational capacity, compliance with design standards and impact on surrounding land and property.

5.2.93 The proposed solution is to substantially improve the roundabout and provide full-width running lanes throughout the junction, replacing the sub-standard narrow lanes that currently exist. These lanes create a capacity restriction due to goods vehicles needing to straddle two lanes for certain manoeuvres. The new roundabout would have a slightly larger diameter and would extend further west and north to accommodate wider circulating lanes, additional pedestrian crossing facilities and improved capacity on exit and entry lanes, particularly for the A23 arm to and from Horley. Associated drainage works to accommodate any surface water run-off as a result of the highway improvements will be included in the Project.

Rail Improvements

5.2.94 Improvements to Gatwick Station are the subject of a separate consenting process, with a planning application submitted by Network Rail to Crawley Borough Council in April 2018 and consented in March 2019. These improvements commenced in 2020 and will be in place prior to operation of the Project.

5.2.95 It is not currently envisaged that any further improvements will be required to the rail station platforms or concourse to accommodate the peak flows generated by the Project. This will be validated within the Environmental Statement to accompany the application for development consent for the Project.

Shuttle Service

5.2.96 The Inter-Terminal Transit System (ITTS) provides a dedicated, elevated people mover system connecting North Terminal and South Terminal (see Figure 5.2.1d). At South Terminal, the station is located adjacent to Gatwick Station. The ITTS comprises a pair of parallel concrete guideways approximately 8 metres above ground level, each operated by a three-car rubber-tyred vehicle, which runs throughout the day.

5.2.97 The ITTS capacity is governed by the size of vehicle, frequency of service and journey time (including the dwell time at each end station). Further work will determine the scale of intervention necessary to adequately cater for demand, noting that some improvements can be made within the existing operation. This is likely to take the form of increased frequency of service.

Water Management

5.2.98 The existing airport drains to local watercourses via balancing ponds and attenuation lagoons. In order to accommodate the alterations to the northern runway, to allow for the areas of new development and to meet current planning requirements (including an allowance for climate change), revisions to the existing surface water drainage strategy are proposed (see Figure 5.2.1e).

5.2.99 A flood risk mitigation strategy will be developed for the Project in consultation with the Environment Agency and the Lead Local Flood Authority. The strategy will ensure that no adverse impact on flood risk is likely off site for events up to a 1% (1 in 100) annual exceedance probability event with a 35% allowance for climate change. In addition, a drainage strategy for surface water runoff will be prepared, with a design standard of 1% (1 in 100) annual exceedance probability event with a 20% allowance for climate change. At this stage, measures are anticipated to include the following.

- Works to realign existing surface water drainage infrastructure along Taxiway Yankee, providing a connection to Pond D.
- Works to protect the existing Substation L from flooding;
- Creation of an additional runoff treatment and storage area (including runoff from de-icing areas) to complement the existing capacity provided by Pond D. This new treatment/storage area would take the form of underground storage beneath car park Y and an extension to the existing Dog Kennel Pond.
- Relocation of Pond A.
- Diversion of part of the River Mole corridor.
- Provision of additional floodplain capacity, through provision of the following flood compensation areas within the airport boundary.
    - Museum Field: Lowering of the existing ground levels in an area known as Museum Field along the western boundary of the site, north of the fire training ground.
    - East of Museum Field: Provision of a new flood compensation area to the east of Museum Field.
    - Car park X: Lowering of the existing ground levels in car park X.
    - Gatwick Stream: Provision of a new flood compensation area to the east of Gatwick Stream, south of Crawley Sewage Treatment Works.

Museum Field

5.2.100 Museum Field would be lowered by up to approximately 2.6 metres below ground level. This would provide a new flood compensation area connected to the River Mole through a spillway. The connection to the spillway would require local lowering of the bank of the River Mole.

5.2.101 It is anticipated that Museum Field would be returned to grassland following completion of the excavation works, with an access track provided around the perimeter. The field would only be occasionally wet, to provide an allowance for storm events.

East of Museum Field

5.2.102 The works to Taxiway Juliet require the relocation of Pond A to a location north of its existing position, through which the River Mole currently flows. It is proposed to provide a diversion of the River Mole to the north of its current course. The diversion would incorporate a two-stage channel and would take a more sinuous course than the current alignment. The existing syphons and culverts would require extension.

5.2.103 In addition, a new flood compensation area is proposed between the River Mole diversion and Museum Field. This would require lowering of ground levels by up to approximately 1.8 metres.

Car Park X

5.2.104 The existing car park X would be lowered by a depth of up to 2 metres. It is anticipated that the car park would be used for staff car parking (surface level parking plus up to one decked storey) following completion of the excavation works, with restrictions on its use when flooding is anticipated.

5.2.105 The car park would be connected to the River Mole via an outfall structure, which may take the form of a flapped culvert or other arrangement to allow fish to pass back into the River Mole following a flood event. A ramp from the existing road network would be provided to allow access to car park X.

Gatwick Stream

5.2.106 A new flood compensation area would be provided to the east of Gatwick Stream. This would require lowering of existing ground levels up to a maximum depth of approximately 3 metres (existing ground levels vary).

5.2.107 The flood compensation area would connect to the watercourse via a lowering of the stream bank.

Foul Water

5.2.108 In order to provide for the new and improved facilities, including wastewater from the extended terminals, hotels and Pier 7, changes would be required to the foul drainage system to improve capacity and resilience (see Figure 5.2.1e).

5.2.109 A new pumping station (Pumping Station 7a) would be provided near the existing Pumping Station 7, to accommodate flows from the extended North Terminal and Pier 7 and a pipeline connection to Crawley Sewage Treatment Works. The proposed pumping station is likely to require a fenced compound with an area of 260 m^2 and be approximately 3 metres in height (above ground level) with elements up to 6 metres below ground level. It is estimated to have a capacity of approximately 80 litres/second.

5.2.110 A second new pumping station would be provided to decouple the existing sewerage network east of the railway and remove its load from the South Terminal sewerage system. This would include a new pipeline connection between the new pumping station and the Crawley Sewage Treatment Works. The pipeline route would be approximately 1270 metres in length and would run east from the pumping station, before turning south to pass around the eastern side of the woodland and south to the treatment works. The proposed pumping station is likely to require a fenced compound with an area of 190 m^2 and be approximately 3 metres in height (above ground level) with elements up to 3 metres below ground level. It is estimated to have a capacity of approximately 45 litres/second.

5.2.111 A third new pumping station (Pumping Station 2a) is proposed to allow for flows from the existing Pumping Station 3 (affected by Taxiway Juliet) and flows from Pier 6. The proposed pumping station is likely to require an area of 50 m^2 and be approximately 2 metres in height (above ground level) with elements up to 10 metres below ground level. It is estimated to have a capacity of approximately 40 litres/second.

5.2.112 Further improvements would include upgraded capacity to existing pipelines and decommissioning of a number of existing pumping stations.

5.2.113 In the event that there is not sufficient capacity within the existing Thames Water Treatment Works or that improvements cannot be made to provide this capacity, an expansion to the existing Crawley Sewage Treatment Works may be required. This would be undertaken separately by Thames Water. However, an area of land has been identified to allow the expansion on land owned by GAL, in case this is required.

Power Strategy

5.2.114 In order to ensure sufficient capacity and that power is provided to the required locations, a number of adjustments would be required to the existing facilities, including relocation of a number of existing services, cables and substations. Part of the existing airfield high voltage ring would be repositioned to the north to allow for the alterations to the existing northern runway and Taxiway Juliet.

5.2.115 Existing substations A, J, BK, BP and BR would be demolished and re-provided to accommodate the following new facilities.

- Substation J: a priority substation, forming part of the airfield ring. The new substation is likely to comprise a containerised substation, with an additional transformer to replace Substation BM. The substation would occupy an area of approximately 180 m^2, with a height of 6 metres above ground level and 3 metres below ground level.
- Substation BK: to be re-provided within an area of approximately 144 m^2, with a maximum height of 6 metres above ground level and 3 metres below ground level.
- Substations BP, BR and A: to be re-provided, each within an area of approximately 25 m^2, with a maximum height of 5 metres above ground level and 3 metres below ground level.

5.2.116 In addition, the following new substations would be required:

- a new substation to be located to the east of the railway in an area known as the Pentagon Field; and
- a new substation to facilitate Pier 7, to the north east of Pier 7 and to the north of the cargo facility.

5.2.117 It is envisaged that the new substations would each require an area of approximately 25 m^2, with a maximum height of 5 metres above ground level and 3 metres below ground level.

5.2.118 The relocation of substations and provision of additional capacity would allow for additional loads and would ensure that substations are located away from areas required for other purposes or at risk of flooding. The existing Substations BJ and BM would be demolished and not replaced.

Landscape and Ecological Planting

5.2.119 The EIA process is ongoing and the development of the design and mitigation measures is therefore provisional at this stage. Currently, the design of the Project includes the following landscape and ecological planting proposals.

- Vegetation retention strategy to ensure green infrastructure assets are retained wherever possible, that important features (such as Riverside Garden Park) are protected and that

adverse impacts on the important features and locally distinctive patterns of development at Gatwick Airport are minimised. This would include protection of existing significant vegetation, including hedgerows, woodland, trees, shrubs, wetland and amenity planting or elements of the Project that lies immediately adjacent to construction areas or maintenance activities.

- Provision of public open space and footpaths, including provision of a new area or areas of public open space at Horley and to provide an extension to the River Mole footpath and associated publicly accessible land.
- Creation of new, high value habitats including woodland, tree, scrub, shrub, wetland/pond and grassland.

5.2.120 These areas are shown on Figure 5.2.1g. Further details are provided in Chapters 8: Landscape, Townscape and Visual Resources and 9: Ecology and Nature Conservation.

Environmental Mitigation Areas

5.2.121 Areas for proposed environmental mitigation are currently under consideration. To date, four areas have been included within the Project. Their locations are shown on Figure 5.2.1g.

- Approximately 0.6 hectares of land immediately to the west of the London to Brighton railway line, north of the current A23. This area is currently used as staff car parking and may be required to provide replacement open space for the Project.
- Approximately 0.4 hectares of land immediately to the west of the London to Brighton railway line, south of the current A23. This area is currently used as staff car parking and may be required to provide replacement open space for the Project.
- Approximately 2 hectares of land to the north east of Longbridge Roundabout. This area would include mitigation required as a result of the Longbridge roundabout highways works and could include surface water drainage measures, landscape and ecological mitigation planting together with any required open space replacement.
- Approximately 19 hectares of land to the east and north east of the Airfield Museum. This area adjoins the western side of the River Mole and current Gatwick Biodiversity Area that runs along the river corridor. This primary purpose for the inclusion of this area is for ecological habitat creation.

Appearance and Design

5.2.122 Many of the components of the Project are relocated airfield elements and it is anticipated that the appearance of the relocated facilities would be similar to the existing facilities. In some cases, the demolition of ageing facilities and replacement with more modern buildings is likely to result in an overall improvement in terms of appearance.

5.2.123 Extensions to the airport terminals are anticipated to be designed to 'tie in' and be in keeping with the design of the existing terminal buildings. Works to be undertaken within the terminals would result in a more modern appearance through reconfiguration and installation of new facilities.

5.2.124 The operator of the proposed hotel buildings would inform the external appearance of these buildings, which would be determined prior to construction and in consultation with the local planning authority.

Lighting Strategy

5.2.125 A lighting strategy will be prepared to accompany the application for development consent, setting out the principles and parameters within which lighting associated with the Project would be designed. The strategy will identify the type of lighting to be used and measures to be implemented to reduce light spill, taking into account effects on nearby sensitive receptors and the safety of ongoing aircraft operations. The strategy will take into account relevant good practice guidance, where appropriate, including the Guidance Notes for the Reduction of Obtrusive Light (Institution of Lighting Professionals, 2020).

5.2.126 The altered northern runway would require new lighting in line with regulatory requirements.

5.2.127 In addition, lighting would be required to all external areas to ensure safety of the public and personnel. The new car parking areas would be lit with directional lighting.

5.2.128 The new road junctions would also require lighting, including of the flyover structures.

5.3. Construction

5.3.1 The details of the proposed construction methods, timing and phasing are necessarily broad at this stage. These details will be refined throughout the EIA process. Accordingly, all dates referred to in this PEIR are indicative and are based on the anticipated programme and timescales described below. Where options remain, the limits of the assessment have been set sufficiently wide to allow a robust assessment to be undertaken of a reasonable worst-case scenario.

Indicative Phasing of Construction Works

5.3.2 The timing of the Project would be dependent on the timing of securing development consent and the discharge of the associated requirements. The indicative construction programme is based on construction commencing in 2024. The programme for the main airfield construction works would be of approximately five years duration enabling the altered northern runway and taxiways to be complete and fully operational in combination with the main runway in 2029. During the construction period the northern runway would not be available as a standby runway for a period of several months.

5.3.3 The indicative phases of the Project are described below. Further details of the indicative phasing assumed within this PEIR for each element of the Project are provided in Appendix 5.5.1.

Table 5.3.1: Indicative Phasing of Construction Works

Anticipated Phasing	Component of the Project
2023	Pre-construction activities (including surveys for any unexploded ordnance and any necessary pre-construction surveys)
2024	Early works, including establishment of compounds, fencing, early clearance and diversion works and re-provision of essential replacement services.
2024-2029	Reconfiguration of existing maintenance airfield facilities (Phase 1) Alterations to the existing northern runway Airfield works to support use of the realigned northern runway

Anticipated Phasing	Component of the Project
2024-2030	Extensions to North and South Terminals
2024-2032	Hotel and commercial facilities
2024-2035	Car parking
2024-2038	Flood compensation areas
2029-2032	Surface access improvements including: ▪ South Terminal roundabout improvements (2029-2030) ▪ North Terminal roundabout improvements (2029-2032) ▪ Works to Longbridge roundabout (2030-2032)
2029-2034	Ongoing reconfiguration of existing maintenance airfield facilities (to final state) Further improvements to airfield facilities
2030-2034	Pier 7
2035	Reinstatement of final land use at temporary construction compound locations

Pre-construction Activities

5.3.4 Prior to any construction works being undertaken, the presence of any unexploded ordnance (such as World War II bombs dropped by aircraft) would be determined.

5.3.5 Some limited pre-construction ecological surveys may be required to confirm the findings of the EIA process and to inform any protected species mitigation licence that may be required.

5.3.6 A programme of archaeological desk-based assessment and field evaluation will be undertaken as part of the EIA process in order to provide a greater level of understanding of the archaeological potential of such areas. Where appropriate, and following consultation with the relevant advisory bodies, further archaeological evaluation and/or detailed excavation may be undertaken at specific locations in advance of any construction works being allowed to progress in that area.

2024 to 2029

5.3.7 A number of activities have been identified that would require construction to commence promptly after the grant of development consent. Early works would include the following.

- Establishment of the main contractor compound, airfield satellite compound and surface access satellite contractor compounds.
- Fencing, early clearance and diversion works and re-provision of essential replacement services.

Alterations to the Existing Northern Runway, Reconfiguration of Taxiways, including Exit/Entrance Taxiways

5.3.8 Works to reconfigure the taxiways would commence in 2024 with works at Taxiway Juliet East (Code C), including clearance and paving works. The existing pavement associated with Taxiway Juliet would be removed and the area returned to grass. Works on the runway exit/entrance taxiways between the northern runway and Taxiway Juliet would also commence at this time.

5.3.9 Works at Taxiway Juliet East (Code E) would start in 2025, including utility diversions, clearance of existing stands, earthworks and paving. The existing pavement associated with Taxiway Juliet

would be removed, the area returned to grass, and drainage would be installed. Work on Taxiway Juliet East (Code C) would be completed during 2025.

5.3.10 Works to provide the Taxiway Lima extension would commence during 2025. This would require the installation of a new airside fence and relocation or protection of existing services. Existing pavement and buildings would be cleared, together with demolition of an existing underground pumping station/water tanks. Earthworks would be required to allow for provision of new pavement to tie in to existing pavement levels.

5.3.11 Works associated with the Taxiway Tango cut-through would also commence during 2025. This would include relocation or protection of existing services, earthworks, provision of new pavement and reconstruction of some existing pavement to tie in to the existing finished pavement levels and the new extension to Taxiway Lima.

5.3.12 Works on the runway exit/entrance taxiways between the northern runway and Taxiway Juliet would be completed during 2025.

5.3.13 Construction works for the adjustments to the existing northern runway are anticipated to commence in 2026. These works are planned for completion in 2027. The redundant 12 metre strip would be broken out and returned to grass.

5.3.14 During 2027, utility diversion works would be carried out to enable the end around taxiways and runway exit/entrance taxiways from/to the main runway to commence.

5.3.15 Works at Taxiway Juliet West would commence and be completed in 2026 (following completion of the utility diversion works), including paving works, which would progress as earthworks advance. The existing pavement associated with Taxiway Juliet West would be removed and the area returned to grass. Drainage would be installed to serve the new Taxiway Juliet West and Juliet West Spur. Works on Taxiway Juliet East (Code E) would be completed at this stage. Therefore, by 2026, Taxiway Juliet West and Taxiway Juliet East would be complete and these routes would be open for aircraft operations.

5.3.16 Works at Taxiway Lima and the Taxiway Tango cut-through would be completed in 2026 and this route would be open for aircraft operations.

5.3.17 Alongside the work on the realignment of the northern runway in 2027, works on the exit/entrance taxiways from the main runway and end around taxiway east would commence.

5.3.18 During 2028, the works on the exit/entrance taxiways from the main runway and on end around taxiway east would be complete. Construction of the Taxiway Juliet West Spur and end around taxiway west would commence, with works on end around taxiway west completed in the same year.

5.3.19 Construction of Taxiway Juliet West Spur is anticipated to be complete during 2029.

Stand Amendments

5.3.20 During 2024, works would commence on the reconfiguration of existing areas of remote stands to allow for the reconfigured Taxiway Lima while retaining stands suitable for Code C aircraft (stands 150-151). This work is anticipated to be completed during 2025.

5.3.21 During 2025, it is proposed that existing stands would be removed/reconfigured to allow for relocation of Taxiway Juliet East. At the same time, work would commence on construction of the new stands north of Taxiway Lima. This work is anticipated to be completed during 2026. Works to provide the new stands associated with Pier 7 would commence in 2025, in order to allow these works to be completed by 2029 (prior to construction of Pier 7).

5.3.22 During 2026, works to provide new stands are proposed to start, including:

- provision of a new area of remote stands and taxiway in an existing area to the north of Taxiway Juliet (in an area to be known as Oscar); and
- provision of one new Code C stand north east of the existing Virgin hangar.

5.3.23 In both cases, these works would continue beyond 2029, as are the new stands are not anticipated to be required until 2031.

5.3.24 The provision of additional stands in the Oscar area would require diversion of existing services and placement of a new foundation for an above ground waterproof shelter for control equipment. Existing structures would be demolished, and excavation to formation layer and importation of granular fill material carried out. A concrete apron would be installed for additional stands and taxiway.

Reconfiguration of Existing Airport Facilities

5.3.25 Construction of the grounds maintenance and surface transport facilities would require diversion and relocation of existing utilities within the footprint of the new building and breakout of the existing pavement to allow construction of foundations. A new foundation would also be constructed for the vehicle storage areas, together with metal framed shed structures and temporary pre-fabricated office and welfare buildings. These works are anticipated to start and be completed in 2024.

5.3.26 The existing fire training ground would be relocated/consolidated within an area in the northern part of its existing location. This would require clearance of existing soft landscape, excavation to the formation layer and installation of an underground collection tank, granular material and new drainage. A new concrete pad would also be required. The existing fire training equipment and fuel supply would be relocated by HGV and crane. These works are planned to start and be completed during 2024.

5.3.27 Phase 1 of the construction of the relocated CARE facility would be commenced during 2024 in order to provide 20% of the eventual capacity required. This would require breakout of the existing pavement, excavation for the proposed biomass boiler (or equivalent) and flue foundations/waste collection skip bay area, and installation of sheet piles for the waste collection skip bay. The building is likely to comprise a steel/portal framed structure, with a biomass boiler installed on concrete plinths, and an above-ground bunded diesel tank. This work is anticipated to be completed in 2025. Phase 2 of the works (to provide the remaining capacity) is anticipated to commence in 2028, for completion after the realigned northern runway becomes operational.

5.3.28 Provision of facilities to allow the motor transport operations to continue during construction would include construction of a landside parking area, with a vehicle wash facility and refuelling area within the existing Long Stay Car Park North. This would require breaking out of existing pavement for a new ground slab, excavation of underground retention tanks and installation of a splash screen. Phase 1 of the works to provide replacement motor transport facilities would start

and be completed in 2025. As for the CARE facility, Phase 2 of the works is anticipated to commence in 2028, for completion after the realigned northern runway becomes operational.

5.3.29 In addition, during 2025 the existing Rendezvous Point North would require relocation in order to re-provide suitable emergency rendezvous area for off-airport emergency services, to the north of the central airport area. This would require diversion and relocation of services, breaking out of the existing pavement for foundations and placement of a new foundation. The replacement facility would include a prefabricated office and welfare building, together with a new gate in the airside fence. In addition, works undertaken at an early stage of construction would include provision of additional internal vehicular access points to ensure sufficient airfield access. These works would require conversion to existing exits to allow for entrance lanes, including provision of closed-circuit television, steel structures and canopies. These works would be completed during 2025.

5.3.30 Works to relocate the existing Virgin infrastructure (such as electrical, communications and water utilities) from the northern side of the Virgin hangar to the southern side would be completed during 2025 in order to ensure continued operation with the extended Taxiway Lima in place.

5.3.31 Works to provide the satellite airport fire service facility would be undertaken during 2026. The satellite fire station would require clearance of existing landscaped areas, diversion of utilities and excavation to the formation layer. Granular fill material would be placed and compacted and foundations (pad foundations for single storey building) installed. A concrete ground slab would also be installed, together with a single storey brick building. This facility is anticipated to be completed in 2027.

Perimeter Boundary Treatments to Mitigate Noise

5.3.32 Works would commence on the noise mitigation feature in 2024, including clearance and removal of existing bund material, placement and compaction of the piling platform, excavation for foundations, installation of pre-cast sections and ground reinstatement.

Internal Access Routes

5.3.33 The existing Larkins Road would require diversion on a temporary basis to ensure continued access. This work (known as Phase 1) would be undertaken in 2024.

5.3.34 The east-west track between the main and northern runways would be constructed during 2028, for completion prior to opening of the realigned northern runway.

Extensions to North and South Terminals

5.3.35 The anticipated programme for the terminal extensions to 2029 would be as follows.

- South Terminal IDL extension: 2025-2027.
- North Terminal baggage reclaim extension: 2026.
- North Terminal IDL extension: 2024-2027.
- North Terminal baggage hall extension: 2027 (to be completed after opening of the realigned northern runway, during 2030).

5.3.36 The terminal extensions would require site clearance, diversion of existing utilities and mechanised break out of existing paved surfaces. New piled foundations would be required.

Internal hoardings would be erected within the existing terminals, with removal of existing façades as required. The new structures would have a structural steel frame.

5.3.37 The North Terminal baggage reclaim extension would also require internal floor decking to be installed, with baggage handling equipment.

5.3.38 Changes to forecourts at North Terminal and South Terminal are anticipated to be undertaken in 2024-2025 and 2025-2026 respectively.

Hotels

5.3.39 The timing of construction for the proposed hotel and commercial facilities would be dependent on the commercial need. However, for the purposes of assessment, it is assumed that the following would be completed prior to opening of the realigned northern runway:

- Hotel at the building compound adjacent to the car rental site: 2024-2025.
- South Terminal hotel: 2027 – 2029 (Phase 1)

5.3.40 Hotel construction would require mechanised break out of existing paved areas, demolition of existing structures and mechanised excavation down to the formation layer and foundation level. Granular sub-base layers would be imported. Piled foundations would be installed. A concrete foundation would support a steel portal frame structure with concrete deck.

Car Parking

5.3.41 An area of Crawter's Field may be required for replacement of the existing 'Purple Parking' that would be removed as part of the Project. Construction of the replacement parking would commence in 2025 (for completion in 2026). Prior to this, permission would be sought to relocate interred ashes located within Crawter's Field to a protected location.

5.3.42 Following this, the broad sequence of provision of the remaining parking is anticipated to be as follows.

- North Terminal Long Stay: 2024-2025 (Phase 1).
- Car park J multi-storey: 2025-2026 (Phase 1), 2026-2027 (Phase 2).
- Car park Y multi-storey: 2026-2028 (underground storage works only).
- Car park H multi-storey: 2027-2028 (Phase 1).
- Pentagon Field (decked parking): 2028-2029.

5.3.43 Multi-storey car park construction would require excavation to the formation layer and foundation level. Granular sub-base layers would then be provided, with installation of piled foundations. Steel portal frame structures with concrete slabs would also be required, together with vehicle barrier fences.

Surface Access Improvements

5.3.44 Any changes to the ITTS shuttle capacity would be made at the end of the current system's working life or in line with passenger growth. These are currently assumed to occur in or around 2026-2027.

5.3.45 Lead-in works for the surface access improvements are anticipated to occur during 2028 to 2029. However, most of the works to provide additional junction capacity would be undertaken following opening of the realigned northern runway (from 2029 onwards).

Water Management, Foul Water and Substations

5.3.46 Works to construct the new Pond A would be commenced immediately following grant of development consent and earthworks would be undertaken at the site of the former Pond A. It is anticipated that this work would commence in 2024.

5.3.47 In addition, works to clear vegetation and commence excavation/ground lowering for the flood compensation areas at Museum Field and east of Museum Field would commence at this time. Works on the diversion of the River Mole and on the flood storage facility beneath car park X would also start in 2024.

5.3.48 During 2025, work on the relocation of Pond A, diversion of the River Mole and the Museum Field flood compensation area would be completed.

5.3.49 Works on the underground storage beneath car park Y would start during 2026 with the extension to the Dog Kennel Pond being undertaken in 2024 - 2025. Excavation/ground lowering for the flood compensation area at car park X would be completed at this time. Works on the underground storage beneath car park Y are anticipated to be completed in 2028.

5.3.50 Works on provision of the new pumping stations (with the exception of Pumping Station 7a) would commence during 2024, for completion in 2025. This would include installation of new buried pipes to form the connection between the new pumping station near South Terminal and the Crawley Sewage Treatment Works.

5.3.51 Works on the relocation of substations BP and BR would be undertaken in 2024, for completion in 2025. The relocation of substations J and BK would also be completed during 2025. Work to relocate Substation A would commence in 2025, for completion in 2026. The new substation at Pentagon Field is anticipated to be constructed during the period 2028-2029.

2029 Onwards

Reconfiguration of Taxiways

5.3.52 Works to amend Taxiways Whiskey, Victor and Zulu are planned for 2031. These works would involve reconfiguration and reconstruction of pavements to accommodate Code E aircraft. Works would largely be located within the area occupied by the existing taxiways but would require incorporation of an additional area to the north of Taxiway Zulu.

Pier and Stand Amendments

5.3.53 Works to provide Pier 7 are anticipated to commence in 2030, for completion in 2034. Works would involve excavation for foundations, placement of a piling platform, piling for foundations and excavation to formation layer. Granular fill would be installed and compacted, with new services provided. A concrete apron would be constructed, together with a steel portal frame superstructure and concrete floor decking. The structure would include passenger areas, screening areas, plant rooms, offices and welfare facilities.

5.3.54 As set out above for the period 2024 to 2029, a number of works to provide new stands would remain ongoing in 2029, including:

- provision of a new area of remote stands in the existing area to the north of Taxiway Juliet (in an area to be known as Oscar); and
- provision of one new Code C stand north east of the existing Virgin hangar.

5.3.55 In both cases, the new stands are anticipated to be completed for use by 2031.

5.3.56 In addition, the conversion of existing remote stands located to the west of Pier 3 to Code C fully serviced stands is proposed to be undertaken in 2030, for completion in 2031.

Aircraft Holding Area

5.3.57 Clearance works to facilitate the proposed holding area (Charlie box) would be completed during 2029, with construction activities in this area following clearance works. These works require reconfiguration of an existing apron area to provide areas for aircraft stands and aircraft hold points. The Charlie box would include new taxiways across the existing area of buildings and roadways and is planned for completion during 2031.

Reconfiguration of Existing Airport Facilities

5.3.58 Phase 2 of works to provide the replacement motor transport and CARE facilities would continue through 2029 for completion in 2030.

5.3.59 Works on Phase 2 of the motor transport facility would require diversion and relocation of existing utilities, breaking out and removal of existing pavement and excavation for underground tanks and inspection bays. A concrete ground slab would be provided as a base for a steel/aluminium framed vehicle shed structure.

5.3.60 Phase 2 of the works to provide the replacement CARE facility would require diversion and relocation of existing utilities, breaking out and removal of existing pavement and excavation for the additional biomass boiler (or equivalent) and flue foundations. Sheet piles would be installed for the waste collection skip bay. The new biomass boiler would be installed on concrete plinths, with an above ground bunded diesel tank.

5.3.61 The timing of the construction of the proposed new hangar would be dependent on the commercial need but is anticipated to commence in 2032 and be completed in 2033. Hangar construction would require excavation for foundations, placement of piling platform, piling for foundations and placement of concrete pile caps. Excavation would be carried out to the formation layer, with installation of granular fill and concrete pavement. The structure would be of steel portal frame construction.

Internal Access Routes

5.3.62 The final diversion of Larkins Road would be undertaken to maintain access to existing and proposed assets (2031-2034).

5.3.63 The autonomous vehicle stations would require excavation for foundations (to formation layer) and placement of concrete pad foundations. Granular fill would be imported and compacted. A concrete ground slab would support a steel portal frame structure with concrete floor decking.

Work on the vehicle route would commence in 2030, with works to the stations undertaken during 2030 to 2034, and the vehicle route in place by 2034.

Extensions to North and South Terminals

5.3.64 By 2029, the extensions to South terminal IDL, North Terminal IDL and the North Terminal baggage reclaim extension would be complete. The anticipated programme for the remaining terminal extensions would be as follows.

- North Terminal baggage hall extension: Commenced in 2027 – anticipated for completion in 2030.
- Provision of a transition space to connect to a new autonomous vehicle facility (both terminals): 2030-2034.

Hotel and Commercial Facilities

5.3.65 As explained above, the timing of construction for the proposed hotel and commercial facilities would be dependent on the commercial need. However, for the purposes of assessment, the following has been assumed.

- Offices: 2030-2031.
- South Terminal hotel: 2030-2031 (Phase 2).
- North Terminal hotel: 2031-2032.

5.3.66 Hotel and office construction would require mechanised break out of existing paved areas, demolition of existing structures and mechanised excavation down to the formation layer and foundation level. Granular sub-base layers would be imported. Piled foundations would be installed. A concrete foundation would support a steel portal frame structure with concrete slab and beams.

Car Parking

5.3.67 The broad sequence of provision of the remaining parking is anticipated to be as follows.

- North Terminal Long Stay: 2031-2032 (Phase 2).
- Car park Y multi-storey: 2031-2032 (Phase 1), 2034-2035 (Phase 2).
- Car park H multi-storey: 2030-2031 (Phase 2).

Surface Access Improvements

5.3.68 Lead-in works for the surface access improvements are anticipated to occur during 2028 to 2029. Works to improve the South Terminal roundabout are anticipated to commence in 2029 and to be complete in 2030. This would be followed by works to the North Terminal roundabout, which would commence in 2029 and be completed in 2032. Compounds associated with the surface access works would be set up ahead of these works (from 2024).

5.3.69 Works to the South Terminal roundabout would require standard highways construction for at-grade highways. The flyover is anticipated to consist of a steel beam superstructure with a concrete slab deck on concrete abutments and piers, and piled foundations. Retaining walls would be required close to existing buildings and Pond G and to separate adjacent links at different levels or gradients. The M23 Spur over the B2036 Balcombe Road would be raised by

up to 2.2 metres. Balcombe Road overbridge would require strengthening or replacement, as well as widening to accommodate slip roads.

5.3.70 Works to the North Terminal roundabout would require standard highways construction for at-grade highways. The flyover is anticipated to consist of a steel beam superstructure with a concrete slab deck on concrete abutments and piers, and piled foundations. Retaining walls would be required to separate adjacent links at different levels or gradients.

5.3.71 Works would be required to the Longbridge roundabout, including alterations to the existing layout. This would require standard highway construction and alterations to signal equipment. These works are anticipated to occur during the period 2031 to 2032.

Water Management, Foul Water and Substations

5.3.72 Works to provide Pumping Station 7a would commence in 2030, with completion anticipated for 2031. This would include installation of new buried pipes to form the connection between Pumping Station 7a and the Crawley Sewage Treatment Works.

5.3.73 Construction of the Gatwick Stream flood compensation area is anticipated to commence in 2036, for completion by 2038.

5.3.74 The new substation proposed north of Pier 7 is anticipated to be constructed during the period 2030 to 2031.

Demolition Activities

5.3.75 In order to allow for the construction of the proposed facilities and reconfiguration of existing facilities, a number of existing facilities would be subject to demolition. These would include the following.

- Decommissioned airfield operations building, including emergency air traffic control tower (2026-2031).
- CARE (recycling area) and motor transport, surface transport and ground maintenance facilities (2025).
- Former TCR Snowbase building (2024).
- Substations A, BK, J, BP, BR, BJ and BM (2025-2030).
- Pumping stations 2, 3, 4, 5, 17 and 45 (2024-2031).
- Part of Purple Parking decked structure (2025-2026).
- Pond A (removal and infill) (2024-2025).
- Parts of the existing fire training area (2024).

5.3.76 In addition to the above, redundant areas of hardstanding would be removed.

Construction Management

5.3.77 It is the applicant's intention that the site would be registered under the Considerate Constructors Scheme or a locally recognised certification scheme.

5.3.78 Construction would be undertaken in accordance with a Code of Construction Practice (CoCP). The CoCP will set out the key management measures that contractors would be required to adopt and implement. These measures will be developed based on those identified during the EIA process. They include strategies and control measures for managing the potential environmental

effects of construction and limiting disturbance from construction activities as far as reasonably practicable. An Outline CoCP is provided at Appendix 5.3.1.

5.3.79 The Outline CoCP would form the basis for the final CoCP and more detailed plans and method statements to be prepared during the pre-construction period once a Principal Contractor has been appointed.

Construction Working Areas

5.3.80 The precise locations of compounds would be determined by the Principal Contractor. However, at this stage, the following main/satellite compounds are anticipated (see Figure 5.2.1f):

- main contractor compound (known as MA1);
- airfield satellite compound (and laydown area); and
- surface access satellite contractor compounds.

5.3.81 All construction compounds would be temporary and would be reinstated to their previous use following completion of construction works (in accordance with the indicative phasing set out in Appendix 5.5.1). Further details and the locations are described in turn below.

5.3.82 In addition, a number of smaller compounds would be associated with construction of each of the elements of the Project.

Main Contractor Compound

5.3.83 The main contractor compound would be located in the south eastern part of the airport, to the west of the perimeter road. The compound would be securely fenced and is anticipated to accommodate:

- main office and welfare facility (including meeting room space, canteen/locker rooms and waste processing area);
- two large or three smaller asphalt and/or concrete batching plants, with associated bulk material storage and handling bays;
- airside processing facility for people, vehicles and materials;
- limited areas for material laydown and inspection;
- parking for contractor, project manager and supply chain vehicles; and
- contractor bus terminal.

5.3.84 The main compound is anticipated to occupy an area of approximately 5 hectares. The tallest elements within the main compound are expected to be components of the batching plants at a maximum of 30 metres above ground level. The location is anticipated to serve the majority of the daily construction workforce and the project management team.

5.3.85 It is likely that a new temporary access from the existing Perimeter Road East would be required to enable separation of construction traffic from the existing operational traffic.

Airfield Satellite Contractor Compound

5.3.86 The satellite compound is anticipated to be to the west of Taxiway Uniform and south of the Boeing hangar. This compound would be securely fenced and is anticipated to accommodate:

- satellite office and welfare facility (including meeting room space, small canteen/locker rooms, waste processing area);
- one concrete batching plant, with associated bulk material storage and handling bays;
- limited areas for material laydown and inspection;
- parking for contractor, project manager and supply chain vehicles; and
- contractor bus terminal.

5.3.87 The satellite compound is anticipated to occupy an area of approximately 6 hectares. The tallest elements within the compound are expected to be components of the batching plant at a maximum of 30 metres above ground level. The location is anticipated to serve airfield works, including the provision of a stockpile location for material to be stored and reused on site.

Surface Access Satellite Contractor Compounds

5.3.88 Satellite compounds for the construction of surface access improvements are anticipated to be required, including:

- a satellite compound to serve works to the South Terminal roundabout; and
- a satellite compound serve works to the North Terminal roundabout.

South Terminal Roundabout Contractor Compound

5.3.89 The compound to serve the works to the South Terminal roundabout would be securely fenced and is anticipated to accommodate:

- satellite office and welfare facility (including meeting room space, small canteen/locker rooms, waste processing area);
- bulk material storage and handling bays;
- limited areas for material laydown and inspection;
- parking for contractor, project manager and supply chain vehicles; and
- contractor bus terminal.

5.3.90 The South Terminal roundabout surface access satellite compound would be located to the north of the South Terminal roundabout and Airport Way. The compound is anticipated to occupy an area of approximately 2 hectares. The tallest elements within the compound are expected to be up to 15 metres in height.

North Terminal Roundabout Contractor Compound

5.3.91 The compound to serve the works to the North Terminal roundabout would be securely fenced and is anticipated to accommodate:

- satellite office and welfare facility (including meeting room space, small canteen/locker rooms, waste processing area);
- a batching plant;
- limited areas for short term material laydown and inspection;
- limited parking for contractor, project manager and supply chain vehicles; and
- contractor bus terminal.

5.3.92 The North Terminal roundabout surface access satellite compound is anticipated to occupy an area of approximately 1.6 hectares. The tallest elements within the compound are expected to be up to 15 metres in height.

Longbridge Roundabout Contractor Compound

5.3.93 The compound to serve the works to the Longbridge roundabout would be securely fenced and is anticipated to accommodate:

- satellite office and welfare facility (including meeting room space, small canteen/locker rooms, waste processing area);
- limited areas for short term material laydown and inspection;
- limited parking for contractor, project manager and supply chain vehicles; and
- drop-off/pick-up area for workforce minibus (if used).

5.3.94 The Longbridge roundabout satellite compound is anticipated to occupy an area of approximately 0.65 hectares. The tallest elements within the compound are expected to be up to 5 metres in height.

Restoration of Temporary Compounds

5.3.95 All compounds are anticipated to cease use in 2035. All temporary compounds would be restored to their previous land use following completion of the works.

Construction Logistics Consolidation Centre

5.3.96 A temporary logistics facility may be required in order to allow scheduling of deliveries to the appropriate work sites. This would comprise an existing secure fenced area, including a warehouse type facility with loading/unloading docks, secure airside screening area, material laydown area, HGV parking, electric vehicle charging stations, driver welfare facilities and some limited parking.

5.3.97 The use of a logistics facility would allow HGV deliveries to the airport to be consolidated, reducing the overall number of deliveries on the local road network.

5.3.98 If such a facility is required, it is likely that the location would be an existing facility or a site with an existing consent for such use. At the current time, traffic modelling has assumed no consolidation centre would be in place, which represents a worst case in terms of total traffic numbers at the site access points. However, if a location is identified, this will be assessed within the EIA process and included within the ES.

Construction Working Hours

5.3.99 In order to maintain safety and minimise disruption to the operation of the airport, any work in close proximity to existing runways and taxiways would require the closure of facilities as operationally necessary and hence are likely to be scheduled to take place overnight.

5.3.100 During construction, the airport would continue to operate on a 24 hour, seven days per week basis. This would include use of the construction compounds and construction working areas on a daily 24-hour basis. It is acknowledged that the use of specified construction equipment and construction processes in sensitive locations, in close proximity to residential properties, and at noise sensitive times, may need to be subject to restrictions in relation to operating hours and limits for operating noise levels, or other mitigation measures, as necessary and practicable. Potential restrictions will be discussed with the relevant regulator.

5.3.101 Where necessary, closures and lane restrictions on the highways network would be undertaken outside peak periods (in terms of traffic flow). To ease congestion on the public highways, deliveries of some materials and movement of workforce may need to be outside of standard day time peak hours (eg overnight and at weekends).

Construction Workforce

5.3.102 It is anticipated that construction would require a workforce of up to approximately 1,300 personnel during peak periods.

Construction Access

5.3.103 All construction traffic would use Junction 9 of the M23, via the M23 spur and Airport Way and into sites at the airport. Construction traffic would be monitored to ensure compliance with proposed routes, unless disruption causes these to be unavailable, in which case signed diversionary routes would be provided.

Construction Activities

5.3.104 Key construction activities would include the following:

- demolition;
- concrete breaking;
- earthworks;
- stockpiling of excavated and demolished material for re-use;
- concrete crushing/screening;
- concrete/asphalt batching;
- cutting;
- excavation;
- dewatering;
- installation of utilities, including water, power, drainage and lighting;
- piling;
- placement of concrete foundations;
- installation of precast concrete panels;
- erection of buildings including portal frames, cladding and roofing;
- building fit out;
- internal road construction;
- paving; and
- road planing.

Construction Vehicles and Traffic Management

5.3.105 Construction works would require the use of the following vehicles and equipment within the working areas:

- asphalt grooving and asphalt paving machines;
- bulldozers;
- combination loader backhoe excavators;
- concrete mixer trucks;
- concrete pump;
- concrete slip form paving machines;

- concrete saw cutters;
- cranes (including mobile cranes);
- elevated working platforms (mobile);
- flat bed trucks (with/without lifting arms);
- front end loaders;
- graders;
- hydraulic arm excavators;
- piling rig;
- roller compactor;
- road milling machines;
- road sweepers;
- steel wheel roller compactors;
- tipper trucks and insulated delivery trucks; and
- water tanker trucks.

5.3.106 A traffic management strategy would be put in place during construction to minimise environmental effects. This would include the following.

- Measures to ensure the transport of construction materials and waste is managed as sustainably as possible noting the impacts of transporting this by road, including the use of rail via facilities close to the airport, where this is appropriate and feasible.
- Timing of construction material and logistics traffic movements that need to come by road to use roads and highways outside of peak periods and to use designated routes into construction sites on the airport which are suitable for this type of traffic.
- Use of Delivery Management Zones, where appropriate, to consolidate materials onto the least number of vehicles and to hold vehicles away from sensitive areas until deliveries are required.
- Measures to encourage the highest possible public transport use for the construction workforce.
- Time shift patterns such that those workers who need to come by road would be using roads and highways outside of peak periods.

Cut and Fill Strategy

5.3.107 The objectives of the earthworks strategy are to maximise the re-use of material, to reduce the amount of material taken off site for disposal and to minimise vehicle movements as far as practicable.

5.3.108 One area within the Project site boundary has been identified as a spoil receptor site. This area at Pentagon Field is anticipated to accommodate approximately 245,000 m^3 of material over the period 2024 to 2031. This would result in the creation of a flatter area with a revised ground level of approximately 63.5 metres above ordnance datum (an increase of up to 4.4 metres above the existing ground level).

5.3.109 Concrete arising from demolition would be crushed on site for re-use. All materials excavated on site would be subject to tests to determine suitability for re-use. It is anticipated that approximately 190,000 m^3 of cohesive material would require disposal to a licenced landfill site.

Drainage during Construction

5.3.110 Temporary drainage would be required during the construction phase to prevent a temporary increase in flood risk as a result of the works. As far as practicable, these would consist of Sustainable Drainage Systems (SuDS) features, such as swales and attenuation ponds, although some piped drainage and pumps may be required. Temporary drainage would be installed in all construction areas not currently provided with drainage systems, and in areas where the construction works have potential to increase surface water runoff, either due to ground compaction or reduction in surface permeability. The drainage would be designed to attenuate runoff rates in rainfall events up to the 1% (1 in 100) annual exceedance probability event to rates no higher than existing and to ensure any discharge to local watercourses or the existing drainage network is similarly attenuated. Suitable treatment would also be provided to manage the water quality of discharges to watercourses.

Construction Lighting

5.3.111 Lighting of the construction sites would be required to ensure that construction work is able to continue safely and effectively during the night-time works and other periods of insufficient natural light. This would include lighting to the construction working areas, storage and circulation areas and access points.

5.3.112 As far as possible, task lighting would be used for specific works to direct light towards the working areas during the night time. Such task lighting would be positioned at low level on posts and directed at the most frequently used areas of work. Lighting is likely to include the following.

- Trailer mounted, mobile, generator powered light plant.
- More permanent lighting. For the main/satellite construction compounds, electricity would be provided from the local grid, allowing the use of:
  - mounted floodlights;
  - street lanterns;
  - linear battens; and
  - wall luminaires.

5.3.113 Lighting for construction compounds and workforce areas would incorporate restricted upwards light spillage and energy efficient fittings. Checks would be carried out on a regular basis to ensure that lighting has not been repositioned.

5.3.114 A lighting strategy for the construction period will be developed to identify the type of lighting to be used and measures to be implemented to reduce light spill, taking into account effects on nearby sensitive receptors and the safety of ongoing aircraft operations.

Sustainability during Construction

5.3.115 A sustainability statement will be prepared for the Project. Gatwick Airport's six sustainability policy goals and ten sustainability objectives will be at the heart of the sustainability framework. In addition, the framework will reflect both the objectives used by the government in the Airports National Policy Statement (Department for Transport, 2018) and the sustainability priorities relevant to the host local authorities within the context of the local natural capital themes/aspects.

5.3.116 Gatwick's ongoing sustainability goals (as set out in their Decade of Change document (GAL, 2021)) are as follows.

People and Communities

- Local economy: be a partner and advocate for a thriving resilient economy and contribute to local and regional workforce skills partnerships and initiatives.
- Opportunity and accessibility: increase workforce diversity through recruitment, training and retention practices and partnerships; and ensure accessibility and opportunity for colleagues and passengers with disabilities.
- Workplace safety: be a leading airport for the safety, health and wellbeing of our workforce and passengers, striving to learn and continually improve.
- Local communities: invest resources in programmes and partnerships for those communities most affected by Gatwick's operations.
- Noise: limit and where possible reduce the airport's impact on local communities by working with partners and stakeholders to create the most noise efficient operation possible.

Net Zero – continue Gatwick's net zero transition and further improve local air quality by:

- Airport emissions
  - Reducing GAL Scope 1 and 2 emissions[6] by a further 25% by 2030 (ie reach 80% under 1990 baseline) as part of a science-based goal of reaching net zero before 2040;
  - Sourcing 50% of airport network electricity and 50% of heat network from UK renewable sources via onsite generation and direct purchase agreements (PPAs) by 2030;
  - Requiring all GAL and airport duty vehicles, ground support equipment and mobile construction equipment to meet zero or ultra-low emission standards by 2030.
- Aircraft and surface access emissions:
  - Playing our part in UK aviation and ground transport transition to net zero carbon.
  - Working with airlines and fuel providers to implement the Sustainable Aviation decarbonisation roadmap and interim goals; and setting a science-based target for Gatwick.
  - Working with transport partners to increase airport passenger and staff usage of public transport and zero and ultra-low emission journey modes to 60% by 2030.

Local Environment

- Water: reduce the airport's potable water consumption by 50% on a per passenger basis by 2030 compared to 2019, continue to improve the quality of water leaving the airport and work with partners to promote local water stewardship.
- Zero waste: ensure that by 2030 all materials used at Gatwick in operations, commercial activity and construction, are repurposed for beneficial use ie repaired, reused, donated, recycled, composted or converted to fuel for heating or transport.

[6] Scope 1 emissions: direct emissions from sources that are owned or controlled by GAL. Scope 2 emissions: indirect emissions from generation of purchased electricity, steam, heating and cooling consumed by GAL.

- Biodiversity: have a sector-leading 'net gain' approach to protecting and enhancing biodiversity and habitats on the airport estate, including zero use of pesticides by 2030; and support biodiversity partnerships in our region.

5.3.117 These objectives will also inform the construction elements of the sustainability statement for the Project which will be implemented through the CoCP (where relevant).

Construction Waste

5.3.118 Surveys would be undertaken prior to demolition of buildings and prior to disposal of materials from the construction site to identify any hazardous materials.

5.3.119 A waste strategy has been developed, identifying the key measures to be taken to avoid, reduce and manage waste during the construction phase.

5.3.120 The purpose of the waste strategy is to demonstrate how waste has been considered in terms of the design of the Project and sets out measures for managing waste during construction and operation. This strategy provides information on the measures for managing waste likely to be generated and details how the wastes would be managed to meet legislative and policy requirements. A draft Waste Strategy is provided at Appendix 5.3.2.

Use of Natural Resources

5.3.121 The EIA Regulations refer to the use of soil, land, water and biodiversity resources. Consideration of potential effects on these resources is set out in Chapters 18, 10, 11 and 9 respectively.

Residues and Emissions

5.3.122 Details of lighting are provided within this chapter and considered within Chapter 8: Landscape, Townscape and Visual Resources and Chapter 9: Ecology and Nature Conservation where relevant. Effects in relation to water, dust and soil are considered in Chapters 11, 13 and 18 respectively.

5.3.123 As set out in Chapter 6: Approach to Environmental Assessment, the Project is not likely to give rise to significant effects in relation to heat or radiation emissions during construction.

Vulnerability to Accidents and Disasters (Construction)

5.3.124 The EIA Regulations require consideration of the effects on the environment deriving from the vulnerability of the Project to risks from major accidents and/or disasters, where these are relevant to the project concerned.

5.3.125 Appendix 5.3.3 considers the potential accidents and disasters that could affect the Project or the environment. However, it is stressed that such events are not considered likely. The Project would not introduce hazards during the construction phase which could not be effectively managed through the CoCP and existing plans and procedures currently in place at the airport.

5.4. Operation and Maintenance

Overview

5.4.1 GAL is the legal owner and operator of Gatwick Airport. This would remain the case throughout the construction phase and during operation of the airport, with the Project in place. GAL therefore has overall responsibility for the management of Gatwick Airport, excluding aircraft maintenance.

5.4.2 A number of specific maintenance areas exist within the airport, including the Hangar 6 and Hangar 7 maintenance areas. These areas are the responsibility of the airlines (BA, Virgin Atlantic, Boeing and easyJet) and it is anticipated that the same would apply to the recently completed Boeing hangar and to the proposed new hangar, once operational.

Operating Hours

5.4.3 As is currently the case, Gatwick Airport would remain operational on a 24-hour, seven days per week basis throughout the construction and operation of the Project. All terminal and hotel buildings and airport car parks are available on this basis.

5.4.4 Flights are subject to night time restrictions between 23:00 to 07:00 local time in accordance with a Noise Restrictions Notice published on behalf of the Department for Transport. Within the core hours of 23:30 to 06:00 a limited number of flights are permitted in accordance with noise and movements quotas. This is expected to remain the case with the Project in place with no increase in quota count within core night hours of 23:00 to 06:000.

Passengers and Operational Workforce

5.4.5 It is anticipated that the Project could increase airport throughput up to approximately 75.6 mppa by 2038, compared to a maximum potential throughput based on existing/planned facilities of 62.4 mppa. This represents an increase of approximately 13.2 mppa. By 2047, it is anticipated that airport throughout would increase to 80.2 mppa with the Project, compared to 67.2 mppa in the absence of the Project.

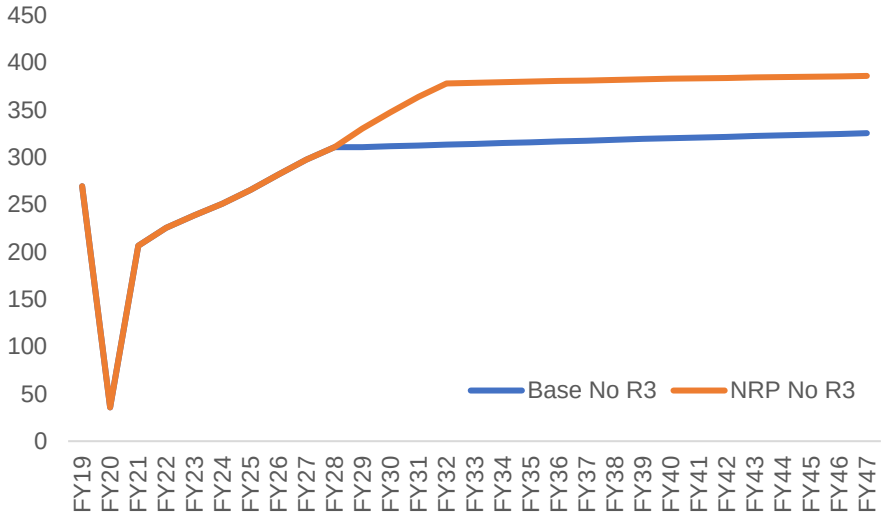
5.4.6 In 2019 approximately 24,000 staff worked at the airport of which approximately 3,300 were employed directly by Gatwick Airport Limited (GAL). In 2020 with the prevailing pandemic conditions, the number of GAL staff fell to approximately 1,900 although this is expected to return to previous levels in line with recovering passenger numbers in the coming years and the total number of employees on site is forecast to increase to over 27,000 by 2029 and then grow towards 28,800 by 2038 in the absence of the Project. The Project is anticipated to result in an increase in approximately 3,200 airport jobs (to approximately 32,000). Modest growth is assumed in the 2038-2047 period with a further 2-3% employees added, taking the total to approximately 29,000 by 2047 without the Project and approximately 32,800 with the Project.

5.4.7 The alterations to the northern runway would allow both of Gatwick's runways to be used concurrently. The northern runway would be used for departing Code C (or smaller) aircraft, whilst the main runway would be capable of handling all movements (as it is today). This has the potential to add capacity and to accommodate the ongoing growth in demand for aviation across the wider UK market.

5.4.8 With the Project, it is estimated that a further 64,000 air traffic movements would be possible compared to the future baseline scenario (see Chapter 4: Existing Site and Operation) in 2038, resulting in 385,000 annual air traffic movements. This would increase slightly to 389,000 by 2047.

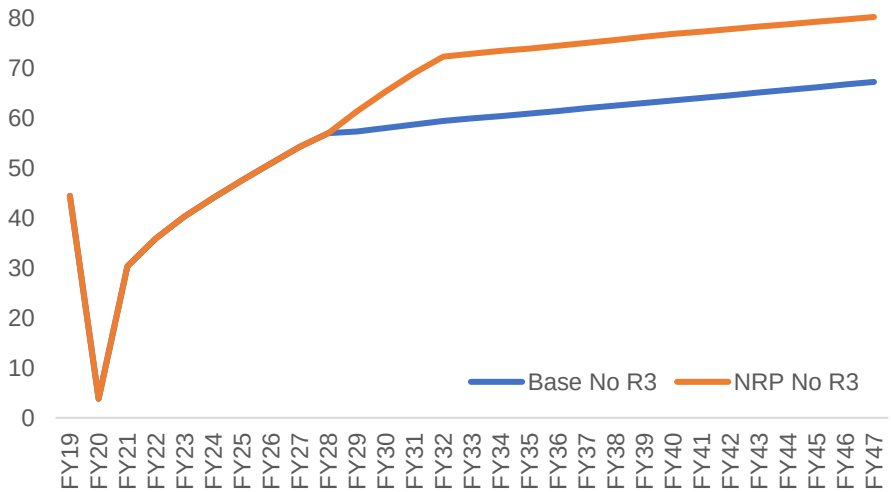
5.4.9 Diagram 5.4.1 shows the predicted change in annual air traffic movements with the Project, with the blue line indicating the future baseline scenario and the orange line indicating the situation with the Project.

Diagram 5.4.1: Predicted Annual Air Traffic Movements with the Project (thousands)



5.4.10 Diagram 5.4.2 indicates the predicted changes in annual passenger throughput with (orange line) and without (blue line) the Project.

Diagram 5.4.2: Predicted Annual Passengers with the Project (mppa)



Transport Management

5.4.11 A Travel Plan would be implemented during operation. This will include specific measures to target staff travel and encourage more sustainable travel patterns.

Airport Operational and Management Procedures

5.4.12 A number of operational and management procedures are currently in place for the management of Gatwick Airport and the existing main runway, as set out in Chapter 4: Existing Site and Operation. These protocols would remain in place with the Project.

Sustainability

5.4.13 As set out in Section 5.3, a sustainability statement will be produced for the Project, based on GAL's sustainability goals. These objectives will continue to inform the operation of the airport.

Climate Change

5.4.14 In addition to GAL's existing net zero carbon commitments, as set out within their Decade of Change document, GAL are currently developing a detailed Carbon and Climate Change Action Plan, to enable the airport to continue to reduce carbon emissions and to deliver sustainable development. Details of the forecast greenhouse gas emissions are set out in Chapter 15: Climate Change and Carbon. The following factors will be considered further:

- the scale of aircraft emissions will be reviewed to take into account the likely evolution and use of sustainable aviation fuels, and to reflect expected gradual transition to electric / hybrid aircraft in use on some domestic and short haul routes;
- more developed data on the design of buildings and infrastructure, and a more informed estimate of the material requirements and waste arisings from the construction of the Project;
- improved information from the strategic transport modelling to inform the assessments of surface access emissions;
- confirmation of the mitigation measures to be implemented and their effect on reducing the emissions arising from the Project including benefits of measures in the Carbon and Climate Change Action Plan currently under preparation; and
- any changes to UK carbon budgets resulting from the revision to the Climate Change Act.

5.4.15 The next steps will include close working with the Project design teams to confirm the adoption of mitigation measures through design of the airport facilities and highways infrastructure, optimisation of material sourcing and recycling of cut/fill materials, management of construction stage emission, and the adoption of the energy strategy to reduce emissions arising from airport operations. The opportunities to mitigate impacts of the Project through both construction and operation will be collated into the draft Carbon and Climate Change Action Plan, to be published as part of the application for development consent.

Energy Demand

5.4.16 GAL aims to continue to reduce operational carbon emissions from energy and fuel consumption associated with the airport's operations in line with its commitment to be net zero before 2040. The energy strategy will continue to evolve and respond to local and national changes to energy infrastructure and to improvements in energy systems' efficiencies over time and GAL will carry

out regular reviews of the strategy (at least every five years) and how it is supporting the airport's carbon trajectory and targets.

5.4.17 A draft energy strategy is provided in Appendix 5.4.1. The draft energy strategy is based on the hierarchy as follows.

- Energy efficiency - in design, construction and operation through highly efficient building envelopes, passive design to reduce heat gains and losses, widespread use of heat recovery, efficient plant and systems, LED lighting and smart energy management systems.
- Efficiency of energy supply – through on-site generation and use of power and heat, with low-carbon heat exported to other users, including the potential for district heating initiatives and the use of smart technology in the electricity and heat networks to support demand management and the matching of supply to demand.
- Renewable energy – generated from locally produced biogas from on-site waste and photo-voltaic systems, heat pumps and other low and zero carbon sources integrated into the design of the new facilities.

Waste

5.4.18 As set out in Section 5.3, a waste strategy has been developed, identifying the key measures to be taken to avoid, reduce and manage waste during the operational phase. A draft Waste Strategy is provided at Appendix 5.3.2.

Use of Natural Resources

5.4.19 The EIA Regulations refer to the use of soil, land, water and biodiversity resources. The potential for operational phase effects on these resources is set out in Chapters 18, 10, 11 and 9 respectively.

Residues and Emissions

5.4.20 Details of lighting are provided within this chapter and considered within Chapter 8: Landscape, Townscape and Visual Resources and Chapter 9: Ecology and Nature Conservation where relevant. Effects in relation to water, dust and soil are considered in Chapters 11, 13 and 18 respectively.

5.4.21 Radiation is used within airports as part of the security screening process, including metal detectors, baggage screening and staff and passenger body screening. Each of these processes is well regulated in order to ensure that receptors are not exposed to any health or environmental risk. The Project would require internal reconfiguration of airport processes but would not introduce any new sources of radiation or include any sources of radiation other than those in use at airports throughout the UK.

5.4.22 The Project would include some changes to the provision of power within the site (eg the potential use of additional biomass boilers). These would be operated in line with existing regulatory and permitting procedures and no sources of significant heat emissions to the atmosphere are anticipated.

5.4.23 Overall, the Project would not include any new or unusual sources of heat or radiation that could lead to significant effects on the environment. The Project would operate in line with normal good practice, regulatory and permitting requirements as is the case for all other UK airports. It is therefore proposed to scope radiation and heat emissions out of the EIA process.

5.4.24 The effects of heatwaves/weather and of external hazards on the Project are considered within Appendix 5.3.3: Major Accidents and Disasters.

Vulnerability to Accidents and Disasters

5.4.25 The EIA Regulations require consideration of the effects on the environment deriving from the vulnerability of the Project to risks from major accidents and/or disasters, where these are relevant to the project concerned.

5.4.26 Appendix 5.3.3. considers the potential accidents and disasters that could affect the Project or the environment. However, it is stressed that such events are not considered likely. Operation of the Project would not result in any significant increase in risk levels.

5.5. Summary of Key Parameters

5.5.1 Table 5.5.1 provides a summary of the key aspects of the Project which form the basis for the assessment of effects. Appendix 5.5.1 sets out the Project parameters and dimensions in further detail.

Table 5.5.1: Summary of Key Aspects of the Project

Element of the Project	Key Parameter for Assessment
Changes to Enable Dual Runway Operations	
Development consent application area	820 hectares
Works within existing GAL land ownership	747 hectares
Permanent land take (third party)	68 hectares
Temporary land take (third party)	6 hectares
Passenger throughput	
Future airport throughput (without Project 2038)	62.4 mppa
Project additional throughput (2038)	13.2 mppa
Proposed new airport throughput (with Project 2038)	75.6 mppa
Air traffic movements	
Approx. future commercial air traffic movements (2038 without Project)	318,000
Approx. future non-commercial air traffic movements (2038 without Project)	2,000
Approx. future total aircraft movements (2038 without Project)	321,000
Project additional commercial air traffic movements (2038 with Project)	64,000
Approx. future commercial air traffic movements (2038 with Project)	382,000
Approx. future non-commercial air traffic movements (2038 with Project)	3,000
Approx. future total aircraft movements (2038 with Project)	385,000
Cargo throughput	
Future cargo throughput (2038 without Project)	254,000 tonnes
Project additional cargo (2038)	69,000 tonnes

Element of the Project	Key Parameter for Assessment
Proposed cargo (with Project, 2038)	323,000 tonnes
Alterations to the Existing Northern Runway	
Centreline repositioning	12 meters to the north
Phasing	
Commencement of main construction phase	2024
Year of opening	2029
Completion of construction works	2038

5.6. Measures Adopted as Part of the Project

5.6.1 The development of mitigation measures is part of an iterative EIA process. Therefore, measures will be developed throughout the EIA process in response to the findings of initial assessments. The Project that forms the subject of the application for development consent will include a range of measures designed to reduce or prevent significant adverse environmental effects arising, where practicable. In some cases, these measures may result in enhancement of environmental conditions. The assessment of effects within this PEIR takes into account all measures that currently form part of the Project and to which GAL is committed. Figure 5.2.1g indicates potential environmental mitigation and enhancement measures areas outside the Gatwick Airport boundary but within the Project boundary.

5.6.2 Details of the measures proposed to be adopted during construction of the Project are provided in Appendix 5.3.1: Outline CoCP. Measures to be adopted during operation will be set out in a series of management plans to be provided, as required, as part of the application for development consent.

5.7. Decommissioning Phase

5.7.1 The Project is proposed to form a long-term part of Gatwick Airport, providing an integral part of the improved airport in order to allow an increase in flight and passenger numbers through making best use of Gatwick's existing runways. Although some elements of the Project would have a defined design life, it is proposed that all elements would be subject to continued maintenance/replacement in line with the management of the airport as a whole. Therefore, the Project, once operational, would form part of a permanent airport and no activities are proposed that would require decommissioning or associated decommissioning plans.

5.8. References

Department for Transport (2018) Airports National Policy Statement [online] https://www.gov.uk/government/publications/airports-national-policy-statement. Accessed October 2019.

GAL (2021) Second Decade of Change to 2030 [online] https://www.gatwickairport.com/globalassets/company/sustainability/reports/2021/decade-of-change-policy-to-2030.pdf

Institution of Lighting Professionals (2020) Guidance Note for the Reduction of Obtrusive Light (01/20)

Reigate and Banstead Borough Council (2019) Reigate and Banstead Local Plan Development Management Plan

5.9. Glossary

Table 5.9.1: Glossary of Terms

Term	Description
CARE	Central Area Recycling Enclosure
CoCP	Code of Construction Practice
GAL	Gatwick Airport Limited
HGV	Heavy Goods Vehicle
IDL	International Departure Lounge
ITTS	Inter-Terminal Transit System
MRF	Materials Recovery Facility
mppa	million passengers per annum
PEIR	Preliminary Environmental Information Report
SuDS	Sustainable Drainage Systems

Preliminary Environmental Information Report
Chapter 6: Approach to Environmental Assessment

September 2021

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6 Approach to Environmental Assessment

6.1. Introduction

6.1.1 This chapter of the Preliminary Environmental Information Report (PEIR) sets out the approach taken to the Environmental Impact Assessment (EIA) process to date, to identify and evaluate the likely significant effects associated with the Project. This chapter also includes details of the consultation undertaken and the overall approach to the assessment of the effects of the Project. Further details of topic specific methodologies, such as survey methods, are provided in the relevant PEIR topic chapters (Chapters 7-19).

6.2. Scope of the Assessment

6.2.1 Scoping is the process of identifying the issues to consider within the EIA process (establishing the scope of the assessment). Scoping is therefore an important preliminary procedure, which sets the context for the EIA process. Through scoping, the key environmental issues are identified at an early stage, which permits subsequent work to concentrate on those environmental topics for which significant effects may arise as a result of a proposed development.

6.2.2 The scoping process is an iterative one, informed by increasing knowledge acquired through the EIA process. Diagram 6.2.1 highlights some of the key inputs to the scoping process. These inputs include the identification of an initial project description, identifying the key components of the Project and their likely maximum parameters. Taking this into account, alongside the characteristics of the environment in the vicinity of the site, the requirements of the EIA Regulations (as defined below) can be reviewed to provide an initial indication of the broad environmental topic areas likely to be relevant to the Project. From this point, the scope of assessment can be refined through the use of scoping workshops, consultation and the findings of initial assessments by topic specialists.

6.2.3 The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017, as amended (hereafter referred to as the EIA Regulations), allow the applicant to request that the Planning Inspectorate (on behalf of the Secretary of State) sets out its opinion (known as a Scoping Opinion) as to the issues to be addressed in the EIA process. Whilst there is no formal requirement in the EIA Regulations to seek a Scoping Opinion prior to the submission of an application, it is recognised best practice to do so.

6.2.4 In September 2019, Gatwick Airport Limited (GAL) submitted a Scoping Report to the Planning Inspectorate, which described the scope and methodology for the technical studies being undertaken to provide an assessment of any likely significant effects and, where necessary, to determine suitable mitigation measures for the construction and operational phases of the Project. It also described those topics or sub-topics which are proposed to be scoped out of the EIA process and provided justification as to why the Project would not have the potential to give rise to significant environmental effects in these areas.

Diagram 6.2.1: Overview of Scoping Process

6.2.5 Following consultation with the statutory bodies, the Planning Inspectorate (on behalf of the Secretary of State) provided a Scoping Opinion on 11 October 2019.

6.2.6 The scope of the EIA process underway for the Project, and the scope of this PEIR, has been informed by legislative requirements, the nature, size and location of the Project, the Scoping Opinion and consultation responses received to date. The structure of this PEIR, including details of the topic chapters, is provided in Chapter 1: Introduction.

6.2.7 Details of the key points raised in the Scoping Opinion and the way in which these have been addressed within the PEIR, or will be addressed during the ongoing EIA process, are provided in Appendix 6.2.1. Further details of topic-specific issues are set out within each of the topic chapters.

6.2.8 Table 6.2.1 summarises the scope of the EIA process in the context of the requirements of Regulation 14(2) of the EIA Regulations. Further details of the requirements of the EIA process are set out within Schedule 4 of the EIA Regulations. Appendix 6.2.2 sets out details of how each of these requirements have been addressed within the PEIR or will be addressed during the ongoing EIA process.

6.2.9 In addition to the key topics identified in Table 6.2.1, it is noted that microclimate and heat effects were identified within the Scoping Opinion as requiring inclusion within the assessment process. These matters are not considered likely to be significant but will be reported within the ES.

Table 6.2.1: Summary of Preliminary Environmental Information Requirements (Regulation 14(2) of the EIA Regulations)

Required Information	Location within PEIR
a) a description of the proposed development comprising information on the site, design, size and other relevant features of the development	Chapter 5: Project Description
b) a description of the likely significant effects of the proposed development on the environment	Chapter 7: Historic Environment Chapter 8: Landscape, Townscape and Visual Resources Chapter 9: Ecology and Nature Conservation Chapter 10: Geology and Ground Conditions Chapter 11: Water Environment Chapter 12: Traffic and Transport Chapter 13: Air Quality Chapter 14: Noise and Vibration Chapter 15: Climate Change and Carbon Chapter 16: Socio-economic Effects Chapter 17: Health and Wellbeing Chapter 18: Agricultural Land Use and Recreation Chapter 19: Cumulative Effects and Inter-relationships Appendix 5.3.1: Outline Code of Construction Practice Appendix 5.3.2: Draft Waste Strategy Appendix 5.3.3: Major Accidents and Disasters
c) a description of any features of the proposed development, or measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment	
d) a description of the reasonable alternatives studied by the applicant, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the development on the environment	Chapter 3: Need and Alternatives Considered
e) a non-technical summary of the information referred to in sub-paragraphs (a) to (d)	Non-technical Summary
f) any additional information specified in Schedule 4 relevant to the specific characteristics of the particular development or type of development and to the environmental features likely to be significantly affected.	See Appendix 6.2.2: Schedule 4 Requirements of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017, as amended.

Topics Scoped out of the EIA Process

6.2.10 Effects on aspects of the environment, other than those listed in Table 6.2.1, are not likely to be significant. The topics scoped out of the assessment are set out below. Further details are provided in the Scoping Report.

Material Assets

6.2.11 The EIA Regulations refer to 'material assets', including cultural heritage, architectural and archaeological aspects and landscape. The phrase 'material assets' has a broad scope, which may include an asset of human or natural origin, valued for heritage, landscape or socio-economic reasons. Material assets are in practice considered across a range of topic areas within the PEIR, in particular the historic environment, landscape and socio-economic chapters. These topics have been included within the EIA process. Therefore, no separate consideration of material assets is considered necessary. This approach was confirmed in the Scoping Opinion provided by the Planning Inspectorate.

Radiation

6.2.12 Radiation is used within airports as part of the security screening process, including through the use of metal detectors, baggage screening and staff and passenger body screening. Each of these processes is well regulated in order to ensure that receptors are not exposed to any health or environmental risk. The Project would require internal reconfiguration of airport processes but would not introduce any new sources of radiation or include any sources of radiation other than those in use at airports throughout the UK.

6.2.13 Overall, the Project does not propose any new or unusual sources of radiation that could lead to significant effects on the environment. The Project would operate in line with normal good practice, regulatory and permitting requirements as is the case for all other UK airports. No radiation emissions are anticipated to occur as a result of the construction process. Radiation emissions have therefore been scoped out of the EIA process. The Scoping Opinion provided by the Planning Inspectorate confirmed that a standalone assessment of radiation effects is not required.

Daylight and Sunlight

6.2.14 Due to the location of the proposed works and the nature of the surrounding infrastructure and land use, it is not considered likely that the Project would have significant effects in relation to daylight and sunlight. Effects on daylight and sunlight have been scoped out of the EIA process. This approach was confirmed in the Scoping Opinion provided by the Planning Inspectorate.

Decommissioning Effects

6.2.15 The Project is proposed to form a long term part of Gatwick Airport, providing an integral part of the improved airport in order to allow an increase in flight and passenger numbers through making best use of Gatwick's existing runways. Although some elements of the Project would have a defined design life, it is proposed that all elements would be subject to continued maintenance/replacement in line with the management of the airport as a whole. Therefore, the Project, once operational, would form part of a permanent airport and no activities are proposed that would require decommissioning or associated decommissioning plans. As such, decommissioning effects for the airport itself have been scoped out of the EIA process. The

removal of any temporary elements of the Project (such as construction compounds) has been assessed within this PEIR and the EIA process. This approach was confirmed in the Scoping Opinion provided by the Planning Inspectorate.

Airspace Change Process

FASI South

6.2.16 As set out in Chapter 4: Existing Site and Operation, work is being undertaken to review the airspace over London and the south east of England, with the aim of addressing existing constraints and allowing for future growth in air transport.

6.2.17 Airspace within the UK is regulated by the Civil Aviation Authority (CAA) and managed by NATS En Route Limited (NERL), which is a subdivision within the National Air Traffic Services (NATS).

6.2.18 Work is being undertaken to review the airspace over London and the south east of England, with the aim of addressing existing constraints and allowing for future growth in air transport. This work is being undertaken by NATS, in partnership with the Department for Transport and the CAA and is known as the Future Airspace Strategy Implementation (FASI) South.

6.2.19 FASI South will be developed through an airspace change consultation in line with the CAA's airspace change process document (CAP1616 (CAA, 2021)). This process for the airspace around Gatwick Airport below 7,000 feet has just re-started (July 2021) but it will be some years before the outcome is clear. However, FASI South is not required in order to allow dual runway operations at Gatwick. The Environmental Impact Assessment (EIA) process for this Project has therefore been undertaken based on current flightpath information, updated to reflect the movement of the centreline of Gatwick's northern runway by 12 metres.

6.2.20 Although the proposed FASI South airspace changes lie outside of the scope of this Project, should information on the outcome of the FASI South process become available during the course of the EIA process (at a time when the information can be taken into account prior to submission), the implications of this, in terms of amended noise impacts, will be reviewed and considered within the EIA process.

Dual Runway Operations

6.2.21 In order to ascertain whether an airspace change is required to enable dual runway operations at Gatwick (with the realignment to the centreline of the northern runway), GAL submitted a Statement of Need within the scope of CAP 1616 to the CAA on 11 November 2019. The CAA issued CAP 1908 in May 2020, assigning the airspace change as Level 0[1] as the proposal would not alter traffic patterns (CAA, 2020). In December 2020, the CAA issued its decision (Decide Gateway): '*The CAA has completed the Decide Gateway Assessment and is satisfied that the change sponsor has met the requirements of the Airspace Change Process. The CAA approves the implementation of this airspace change proposal.*' CAP 1908 notes that all physical works associated with the Northern Runway Project would be considered through the DCO consenting process.

[1] Level 0: Changes to nomenclature or qualifying remarks of notified airspace design that will not later air traffic patterns. Change sponsors are required only to complete Stage 1A of the airspace change process.

Transboundary Effects

6.2.22 The EIA Regulations require consideration of transboundary effects of development on the environment. Transboundary effects are the effects of a project on the environment of another European Economic Area (EEA) member state. The need to consider such transboundary effects has been embodied by the United Nations Economic Commission for Europe on EIA in a Transboundary Context (commonly referred to as the 'Espoo Convention'). The Convention requires that assessments are extended across borders between parties of the Convention when a planned activity may cause significant adverse transboundary impacts.

6.2.23 Paragraph 3 of Schedule 3 to the EIA Regulations requires that '*the likely significant effects of the development on the environment must be considered… taking into account - … (c) the transboundary nature of the impact'.* Further, at Schedule 4, the EIA Regulations state that the ES must include *'[t]he description of the likely significant effects on the factors specified in regulation 5(2) should cover the direct effects and any indirect, secondary, cumulative, transboundary… effects of the development*'. Regulation 32 also obligates the Planning Inspectorate to form a view on the potential for transboundary impact and consult with relevant EEA states.

6.2.24 The Planning Inspectorate Advice Note Twelve (Planning Inspectorate, 2020c) outlines the legal context and the process for undertaking a transboundary assessment. The advice note states that the Inspectorate should determine whether or not the development is likely to have significant effects on the environment within another EEA State. A transboundary screening exercise has been undertaken to aid the Inspectorate and details are provided in Appendix 6.2.3.

6.2.25 The screening exercise concluded that significant transboundary effects can be ruled out for the majority of aspects. Two environmental aspects were identified for which there could conceivably be a transboundary effect (effects on migratory bird species and effects on climate change). The conclusions are summarised below.

6.2.26 Ashdown Forest is located within 20 km of the Project site and is designated for the European nightjar *Caprimulgus europaeus* and the Dartford warbler (*Sylvia undata*). The European nightjar is a migratory species. The potential for impacts on migratory species supported by Ashdown Forest (as a result of air quality emissions from traffic) has been considered throughout the environmental assessment process. The conclusions of the assessment process to date are presented in Appendix 9.9.1, the Habitat Regulations Assessment. Impacts on migratory species are unlikely, given the distance of the European designated sites from the airport, the distance over which any changes in traffic would result in any effect on air quality (and therefore habitat) and the regulatory regime in place to protect European designated sites. As set out in Appendix 9.9.1, no significant effects are predicted.

6.2.27 Due to the global nature of climate change impacts, the receptor for impacts is the global climate. Impacts should therefore be considered in terms of the contribution to global greenhouse gas levels within the EIA process, as impacts cannot be attributed to any individual EEA states. The assessment of impacts and effects on the global climate is provided in Chapter 15: Climate Change and Carbon.

6.2.28 The information presented in Appendix 6.2.3 does not identify any potential for significant effects on the environment in other EEA States.

6.3. Environmental Assessment Methodology

Relevant EIA Guidance

6.3.1 The following government or institute guidance has been taken into account during the EIA process:

- National Planning Practice Guidance (Ministry of Housing, Communities and Local Government, 2019);
- Mitigation Measures in Environmental Statements (Department of the Environment, Transport and of the Regions, 1997);
- Design Manual for Roads and Bridges: Sustainability and Environmental Appraisal. LA 104: Environmental assessment and monitoring (Highways England *et al*., 2020);
- Guidelines for Environmental Impact Assessment (Institute of Environmental Management and Assessment (IEMA), 2004);
- Environmental Impact Assessment Guide to: Shaping Quality Development (IEMA, 2015a);
- Environmental Impact Assessment Guide to: Climate Change Resilience and Adaption (IEMA, 2015b);
- Environmental Impact Assessment Guide to: Delivering Quality Development (IEMA, 2016);
- Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance (IEMA, 2017a);
- Health in Environmental Impact Assessment: A Primer for a Proportional Approach (IEMA, 2017b);
- Planning Act 2008: Guidance on the pre-application process for major infrastructure projects (Ministry of Housing, Community and Local Government, 2015);
- Advice Note Three: EIA Consultation and Notification (Planning Inspectorate, 2017);
- Advice Note Six: Preparation and Submission of Application Documents (Planning Inspectorate, 2020a);
- Advice Note Seven: Environmental Impact Assessment: Preliminary Environmental Information, Screening and Scoping (Planning Inspectorate, 2020b);
- Advice Note Nine: Using the Rochdale Envelope (Planning Inspectorate, 2018);
- Advice Note Twelve: Transboundary Impacts and Process (Planning Inspectorate, 2020c);
- Advice Note Seventeen: Cumulative Effects Assessment (Planning Inspectorate, 2019).

6.3.2 Other topic-specific specialist methodologies and good practice guidelines have been drawn on as necessary and are set out in each topic chapter.

Methodology and Assessment Criteria

6.3.3 Each topic chapter provides details of the methodology for baseline data collection and the approach to the preliminary assessment of effects. Each environmental topic has been considered by a specialist in that area.

6.3.4 Each topic chapter defines the scope of the assessment within the methodology section, together with details of the study area, desk study and survey work undertaken. The identification and evaluation of effects have been based on the information set out in Chapter 5: Project Description, EIA good practice guidance and relevant topic-specific guidance where available.

Baseline Conditions

Existing Baseline Conditions

6.3.5 The existing and likely future environmental conditions in the absence of the Project are known as 'baseline conditions'. Each topic-based chapter includes a description of the current (baseline) environmental conditions. The baseline conditions at the site and within the study area form the basis of the assessment, enabling the likely significant effects to be identified through a comparison with the baseline conditions.

Future Baseline Conditions

6.3.6 As set out in Chapter 4, a number of improvements are proposed at Gatwick Airport to accommodate the predicted increase in passenger numbers in the absence of the Project. The likely timing of these improvements has been taken into account through the use of future baseline scenarios and assessment years (see below).

6.3.7 The consideration of future baseline conditions has also taken into account the likely effects of climate change, as far as these are known at the time of writing. This has been based on information available from the UK Climate Projections project, developed by the Met Office and Environment Agency (Met Office, 2018), which provides information on plausible changes in climate for the UK and on published documents such as the UK Climate Change Risk Assessment 2017 (HM Government, 2017).

6.3.8 Topic authors have also considered other factors relevant to identification of future baseline conditions, such as trends in population size of protected species or changes in socio-economic conditions over time.

Assessment of Effects

6.3.9 The EIA Regulations require the identification of the likely significant environmental effects of the Project. The overarching approach taken within this preliminary assessment is set out below.

Assessment Years

6.3.10 The approach to assessment has incorporated the use of identified assessment years to allow for preliminary evaluation of the likely effects during the phased construction process and during the operation of the Project. The following assessment years have been used to inform this PEIR:

- 2024 to 2029, representing the initial construction phase prior to opening of the altered northern runway;
- 2029: represents the opening year of the altered northern runway (and therefore the first point at which effects arising from its operation would occur);
- 2032: an interim assessment year;
- 2038: representing the year in which the development works proposed as part of the Project would be completed; and
- 2047: to meet a specific requirement of guidance in the Design Manual for Roads and Bridges to assess impacts 15 years after the last of the key highways works associated with the Project are due to be completed.

6.3.11 For the purposes of this PEIR, assessment concentrates on the period 2024 to 2038, with modelling topics modelling 2029, 2032 and 2038 as the primary assessment years. In addition,

for some topics it is a requirement to assess the effects of the highways improvements 15 years after completion. Therefore, for these topics, an assessment is provided for 2047. Although the throughput at the airport is predicted to grow slightly between 2038 and 2047, no greater effects for other topics are predicted in this assessment year (due to factors such as improvements in aircraft performance over time).

6.3.12 For some of the assessment years (including the airfield opening year (2029) and the interim assessment year (2032)), construction activities would occur alongside operation of the altered northern runway and this has been taken into account in the assessments. In some cases, individual topic chapters may also identify additional years to be included in the assessment work, in accordance with topic-specific good practice guidance.

6.3.13 As set out in Chapter 5: Project Description, this PEIR considers an increase in passenger throughput up to approximately 75.6 mppa by 2038.

Assessing the Likely Effects of the Project

6.3.14 Each topic chapter clearly defines its approach to the evaluation of significance and the methodology used for the EIA process. The PEIR provides a preliminary view on the likely significant effects which will be refined during the ongoing EIA and iterative design process.

6.3.15 This section provides details of the overarching methodology for the EIA process. This has been used to inform the approach to assessment for each environmental topic, except where topic-specific guidance or usual practice for that topic indicates otherwise. The overarching approach takes into account both the sensitivity of receptors affected and the magnitude of the likely impact in determining the significance of the effect.

Sensitivity or Importance of Receptors

6.3.16 Receptors are defined as the physical or biological resource or user group that would be affected by a project. For each topic, baseline studies have informed the identification of potential environmental receptors. Some receptors will be more sensitive to certain environmental effects than others. The sensitivity or value of a receptor may depend, for example, on its frequency, extent of occurrence or conservation status at an international, national, regional or local level.

6.3.17 Sensitivity has been defined within each of the topic chapters of the PEIR, where appropriate, and takes into account the factors including:

- vulnerability of the receptor;
- recoverability of the receptor; and
- value/importance of the receptor.

6.3.18 Sensitivity has generally been described using the following scale:

- high;
- medium;
- low; and
- negligible.

6.3.19 In some cases, a further category of ‘very high’ has been used.

6.3.20 As a general rule, the receptor sensitivity levels have been defined as set out in Table 6.3.1.

Table 6.3.1: Definitions of Receptor Sensitivity (based on Highways England *et al*., 2020)

Sensitivity	Typical Descriptors
Very High	Very high importance and rarity, international scale and very limited potential for substitution.
High	High importance and rarity, national scale and limited potential for substitution.
Medium	High or medium importance and rarity, regional scale, limited potential for substitution.
Low	Low or medium importance and rarity, local scale.
Negligible	Very low importance and rarity, local scale.

Magnitude of Impact

6.3.21 Impacts are identified as the physical changes to the environment attributable to the Project. For each topic, the likely environmental impacts have been identified. The magnitude of the impact has been described using the criteria defined within each topic chapter.

6.3.22 The categorisation of the impact magnitude has taken into account the following four factors:

- extent;
- duration;
- frequency; and
- reversibility.

6.3.23 Impacts have been defined as either adverse or beneficial. They may also be described as listed below.

- Direct: arise from activities associated with the Project. These tend to be either spatially or temporally concurrent.
- Indirect: impacts on the environment which are not a direct result of the Project, often produced away from the Project site or as a result of a complex pathway.

6.3.24 Impacts have been divided into those occurring during the construction phase and those occurring during operation. As set out above, interim assessment years have been considered, where construction and operational activities may overlap. Where appropriate, chapters have referred to temporary and permanent impacts (where temporary impacts are those that last for a limited period of time).

6.3.25 The impacts related to land take have been assessed as part of the construction process within the year that the impact would occur. These impacts could be considered either temporary or permanent depending on whether the land would be restored following completion of the construction phase.

6.3.26 With respect to the duration of temporary impacts, the following has been used as a guide within this assessment, unless defined separately within the topic chapters:

- Short term: A period of months, up to one year
- Medium term: A period of more than one year, up to five years; and
- Long term: A period of greater than five years.

6.3.27 Magnitude has generally been described using the following scale:

- high;
- medium;
- low; and
- negligible.

6.3.28 In some cases, a further category of 'no change' has been used.

6.3.29 As a general rule, magnitude levels have been defined as set out in Table 6.3.2.

Table 6.3.2: Definitions of Impact Magnitude (based on Highways England *et al*., 2020)

Magnitude	Typical Descriptors
High	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features and elements (Adverse).
	Large scale or a major improvement of resource quality; extensive restoration or enhancement; major improvement of attribute quality (Beneficial).
Medium	Loss of resource but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements (Adverse).
	Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality (Beneficial).
Low	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements (Adverse).
	Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring (Beneficial).
Negligible	Very minor loss or detrimental alteration to one or more characteristics, features or elements (Adverse).
	Very minor benefit to or positive addition of one or more characteristics, features or elements (Beneficial).
No change	No loss or alteration of characteristics, features or elements; no observable impact in either direction.

Significance of Effects

6.3.30 Effect is the term used to express the consequence of an impact (expressed as the 'significance of effect'), which is determined by considering both the magnitude of the impact and the sensitivity of the receptor affected.

6.3.31 The magnitude of an impact does not generally directly translate into significance of effect. For example, a significant effect may arise as a result of a relatively modest impact on a resource of national value, or a large impact on a resource of local value. In broad terms, therefore, the significance of the effect can depend on both the impact magnitude and the sensitivity or importance of the receptor.

6.3.32 Significance levels are defined separately for each topic, taking into account relevant topic-specific guidance, based on the scale set out below;

- substantial;
- major;
- moderate;
- minor; or
- negligible.

6.3.33 Table 6.3.3 sets out the general approach proposed to inform the assessment of significance based on the sensitivity of the receptor and the magnitude of impact. This matrix has informed the topic-specific methodologies. For some topics, a simplified approach is considered appropriate or the approach may be informed by topic-specific guidance.

Table 6.3.3: Assessment Matrix

Sensitivity	Magnitude of Impact				
	No Change	Negligible	Low	Medium	High
Negligible	No change	Negligible	Negligible or Minor	Negligible or Minor	Minor
Low	No change	Negligible or Minor	Negligible or Minor	Minor	Minor or Moderate
Medium	No change	Negligible or Minor	Minor	Moderate	Moderate or Major
High	No change	Minor	Minor or Moderate	Moderate or Major	Major or Substantial
Very high	No change	Minor	Moderate or Major	Major or Substantial	Substantial

6.3.34 Where a range of significance levels are presented, the final assessment for each effect is based upon expert judgement.

6.3.35 In all cases, the evaluation of receptor sensitivity or value, impact magnitude and significance of effect has been informed by professional judgement and is underpinned by narrative to explain the conclusions reached.

6.3.36 Unless set out otherwise in each topic chapter, effects assessed as moderate or above are considered to be significant within the assessment.

Addressing Uncertainty or Difficulties in Assessment

6.3.37 There is some degree of inherent uncertainty within the EIA process, in relation to factors such as future improvements to construction and design, the potential effects of climate change on existing receptors and in terms of the margin of error within forecasting or modelling tools. The text below sets out the proposed approach to addressing uncertainty. In all cases, where uncertainty exists, or where difficulties have been encountered, this has been identified within the relevant chapter of the PEIR, together with details of the measures that have been taken to reduce uncertainty as far as reasonably practicable. As the EIA process progresses, the degree of uncertainty is anticipated to reduce.

Project Parameters

6.3.38 The EIA process to date has been undertaken based on the description set out in Chapter 5: Project Description. The existing airport provides a number of constraints that have informed the Project design, including constraints with regard to location, available space and phasing, given the need to ensure continued use of the airport during construction of the Project. In addition, GAL's experience in operating Gatwick Airport has ensured that the design of many components of the Project is well understood. This has limited the number of options that have been carried forward through the EIA process. However, flexibility will need to be retained with regard to the detailed design of some elements of the Project, particularly for those elements that would be constructed later in the construction programme or that would be operated by third parties (such as hotels).

6.3.39 Where flexibility is required, guidance produced by the Planning Inspectorate with regard to the use of the 'Rochdale envelope' approach (Planning Inspectorate, 2018) has informed the key parameters identified for assessment. This includes the 'worst case' option from the realistic and likely options that may be developed. Where the assessment shows that no significant effect is anticipated for the worst case option, it is assumed that other (lesser) options would also have no significant effect.

6.3.40 Any assumptions made regarding the maximum design scenarios have been identified in each of the topic chapters and have been selected as those having the potential to result in the greatest effect on an identified receptor or receptor group.

Future Baseline and Assessment Years

6.3.41 The approach to assessment of future baseline conditions and the use of assessment years is set out under the 'Baseline Conditions' section above. The assessment has taken into account future baseline conditions at the airport (including growth in throughput and consented/committed developments that would occur in the absence of the Project), as set out in Chapter 4.

6.3.42 There will always be some element of uncertainty regarding future trends in environmental conditions and climate. The assessments made have been based on the most up to date information available at the time of assessment, including information available from the UK Climate Projections project and on published documents such as the UK Climate Change Risk Assessment 2017 (HM Government, 2017). This information has been reviewed by climate change technical specialists in order to inform Chapter 15: Climate Change and Carbon.

Forecasting and Modelling

6.3.43 Whilst there is inherent uncertainty in predicting long term aviation growth, the forecasts presented have been prepared jointly by GAL's in-house airline relations and marketing and research teams and ICF, one of the UK's foremost experts in air traffic forecasting.

6.3.44 As set out in Chapter 4: Existing Site and Operation, the COVID-19 pandemic had a very severe impact on the global aviation industry in 2020. Gatwick, along with all other UK airports, experienced a significant reduction in passenger traffic levels as a result of both Government-imposed restrictions on air travel and reduced passenger demand driven by low consumer confidence. While the immediate outlook remains challenging, the current forecasts indicate that passenger and airline demand at Gatwick will return to previous levels over the course of the next few years and then continue to grow thereafter.

6.3.45 In preparing the forecasts, regard has been had to the importance of having a realistic view of the level and characteristics of air traffic growth that would occur at Gatwick, whilst also ensuring that the environmental impacts of Gatwick's growth, some of which, such as noise, traffic and carbon, rely heavily on the forecasts, are not understated. This also accords with advice from the Planning Inspectorate to ensure that realistic 'worst case' environmental impacts are understood. For this reason, the forecasts presented are considered to represent a robust and realistic view of the level of traffic growth but are likely to be towards the upper end of the levels of growth that could occur at Gatwick.

6.3.46 Where modelling tools have been used within the topic assessments, care has been taken to ensure that the tool selected is appropriate for the assessment, taking into account topic-specific good practice and guidance. Calibration has been used to ensure a reasonable degree of accuracy in measurements. Topic chapters within the PEIR set out measures taken to address any uncertainty with regard to modelling inputs and outputs and any assumptions made.

Mitigation, Monitoring and Enhancement Measures

6.3.47 The EIA Regulations (Regulation 14(2)(c)) require that where significant effects are identified '*a description of any feature of the Project, or measures envisaged in order to avoid, prevent or reduce or, if possible, offset any likely significant adverse effects on the environment*' should be provided.

6.3.48 The development of mitigation measures is part of the iterative EIA process. Therefore, measures are under consideration throughout the EIA process in response to the findings of initial assessments. The Project that forms the subject of the application for development consent will include a range of measures designed to reduce or prevent significant adverse environmental effects arising, where practicable. In some cases, these measures may result in enhancement of environmental conditions. The assessment of effects within this PEIR takes into account all measures that currently form part of the Project and to which GAL is committed. These measures are currently at an early stage of development and will be refined further through the EIA process and in response to consultation, prior to preparation of the final ES.

6.3.49 The topic chapters included in this PEIR consider the following mitigation types:

- measures included as part of the Project design (sometimes referred to as primary or embedded mitigation);
- measures proposed to avoid effects occurring or to minimise environmental effects, such as measures to control light spillage (sometimes referred to as secondary mitigation). Where these measures relate to the construction phase, they will be implemented through the Code of Construction Practice (CoCP) and any other environmental management plans; and
- measures required as a result of legislative requirements or standard good practice (sometimes referred to as tertiary mitigation). Although many of these measures are regulated separately, these measures will also be included within the CoCP and any other environmental management plans for completeness.

6.3.50 Where required, further mitigation measures have been identified in individual topic chapters. These are measures that could further prevent and, where possible, offset any residual adverse effects on the environment. Where this is the case, residual effects with the further mitigation in place have been considered.

6.3.51 Where appropriate, monitoring measures have been set out within each topic chapter of the PEIR.

6.3.52 Mitigation and monitoring measures identified to control construction effects would be implemented through the CoCP. Where necessary, for example in relation to the future management of any ecological mitigation areas, operational management plans would be developed. An outline CoCP is provided at Appendix 5.3.1.

6.3.53 As the EIA process progresses, further work in relation to mitigation measures will be undertaken and this will inform the design of the Project for which development consent is sought. This will be reflected in the ES. The draft Development Consent Order (DCO) will be developed to be consistent with the measures identified in the ES, CoCP and any draft management plans, in order to ensure consistent implementation of the measures identified through the EIA process.

Cumulative and Inter-related Effects

6.3.54 Cumulative effects with other proposed developments have been assessed as part of the EIA process. This includes consideration of whether the Project, when considered together with other proposed developments, may result in any greater effects on a receptor than the effects of the Project alone.

6.3.55 In addition, inter-relationships between topic areas have been considered, in order to ensure that effects on a receptor arising from more than one environmental topic area are considered.

6.3.56 Further details of the approach to this assessment are provided in Chapter 19: Cumulative Effects and Inter-relationships. Details of the other proposed development considered within the cumulative effects assessment are set out at Appendix 19.4.1.

6.4. Next Steps

6.4.1 The PEIR provides a preliminary view on the likely significant effects and the appropriate methodologies to assess and address those effects. The environmental assessment is ongoing and, therefore, the development of the Project design and appropriate mitigation, monitoring and enhancement measures will be refined alongside the continued assessment and taking into account the consultation responses received. The findings will be reported in the ES, which will form part of the application for development consent.

6.5. References

Legislation

The Infrastructure Planning (Environmental Impact Assessment) Regulations, 2017. 2017 No. 572.

The Town and Country Planning and Infrastructure Planning (Environmental Impact Assessment) (Amendment) Regulations 2018. 2018 No. 695.

Published Documents

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6.6. Glossary

Table 6.6.1: Glossary of Terms

Term	Description
CoCP	Code of Construction Practice
DCO	Development Consent Order
DMRB	Design Manual for Roads and Bridges
EEA	European Economic Area
EIA	Environmental Impact Assessment
ES	Environmental Statement
FASI	Future Airspace Strategy Implementation
GAL	Gatwick Airport Limited
IEMA	Institute of Environmental Management and Assessment
NATS	National Air Traffic Services
NPPF	National Planning Policy Framework
NPPG	National Planning Practice Guidance
PEIR	Preliminary Environmental Information Report

Preliminary Environmental Information Report
Chapter 7: Historic Environment

September 2021

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7 Historic Environment

7.1. Introduction

7.1.1 This chapter of the Preliminary Environmental Information Report (PEIR) presents the findings of the Environmental Impact Assessment (EIA) work undertaken to date concerning the potential effects of the proposal to make best use of Gatwick's existing runways (referred to within this report as 'the Project') on the historic environment.

7.1.2 This PEIR chapter considers the potential effects of the Project on historic environment resources (heritage assets), including historic buildings and areas, historic landscape character and buried archaeological remains. Such effects could be in the form of a direct physical impact leading to loss of, or damage to the heritage asset, or harm to the significance of the asset resulting from change within its setting.

7.1.3 In particular, this PEIR chapter:

- sets out the existing and future environmental baseline conditions, established from desk studies, surveys and consultation to date;
- presents the potential environmental effects on all aspects of the historic environment arising from the Project, based on the information gathered and the analysis and assessments undertaken to date;
- identifies any assumptions and limitations encountered in compiling the environmental information; and
- highlights any necessary monitoring and/or mitigation measures that could prevent, minimise, reduce or offset the possible environmental effects identified in the EIA process.

7.1.4 Further details regarding relevant legislation, policy and guidance, and the assessed historic environmental resources, are presented within Appendix 7.6.1: Historic Environment Baseline Report. A summary of the stakeholder responses to consultation regarding the scope of the assessment is provided in Appendix 7.3.1: Summary of Stakeholder Scoping Responses for Historic Environment.

7.1.5 The PEIR will inform pre-application consultation. Following consultation, comments on the PEIR will be reviewed and taken into account, where appropriate, in preparation of the Environmental Statement (ES) that will accompany the application to the Planning Inspectorate for development consent.

7.2. Legislation and Policy

Legislation

7.2.1 The principal legislation relevant to this assessment comprises the Ancient Monuments and Archaeological Areas Act (1979) amended by the National Heritage Acts (1980, 1983, 2002), along with the Planning (Listed Buildings and Conservation Areas) Act (1990) and the Town and Country Planning Act (1971).

7.2.2 Further details of the relevant legislation are provided in Section 2 of Appendix 7.6.1: Historic Environment Baseline Report.

Planning Policy Context

National Policy Statements

7.2.3 The Airports National Policy Statement (NPS) (Department for Transport, 2018), although primarily provided in relation to a new runway at Heathrow Airport, remains a relevant consideration for other applications for airport infrastructure in London and the south east of England.

7.2.4 The NPS for National Networks (Department for Transport, 2015) sets out the need for development of road, rail and strategic rail freight interchange projects on the national networks and the policy against which decisions on major road and rail projects will be made. This has been taken into account in relation to the highway improvements proposed as part of the Project.

7.2.5 Table 7.2.1 provides a summary of the relevant requirements of these NPSs and how these are addressed within the PEIR.

Table 7.2.1: Summary of NPS Information Relevant to this Chapter

Summary of NPS requirement	How and where considered in the PEIR
Airports NPS	
As part of the environmental statement, the applicant should provide a description of the significance of the heritage assets affected by the proposed development, and the contribution of their setting to that significance. The level of detail should be proportionate to the asset's importance, and no more than is sufficient to understand the potential impact of the proposal on the significance of the asset (paragraph 5.193).	The description of the significance of the assets affected by the Project, and the contribution of their setting to that significance, is presented within Appendix 7.6.1: Historic Environment Baseline Report and summarised within Section 7.6 of this chapter.
Where a site on which development is proposed includes or has the potential to include heritage assets with archaeological interest, the applicant should include an appropriate desk-based assessment and, where necessary, a field evaluation (paragraph 5.193).	The appropriate desk-based assessment and a summary of the results of field evaluations are presented within Appendix 7.6.1: Historic Environment Baseline Report and summarised within Section 7.6 of this chapter.
The applicant should ensure that the extent of the impact of the proposed development on the significance of any heritage asset can be adequately understood from the application and supporting documents (paragraph 5.193).	The impact of the Project on the significance of heritage assets is described in Section 7.9 of this chapter.
Detailed studies will be required on those heritage assets affected by noise, light and indirect impacts based on the guidance provided in The Setting of Heritage Assets and the Aviation Noise Metric (paragraph 5.194).	Impacts have been considered in accordance with the cited guidance documents. The guidance used is described in Section 7.4 of this chapter. The assessment is provided in Section 7.9.
Where proposed development will affect the setting of a heritage asset, accurate representative visualisations may be necessary to assess the impact (paragraph 5.194).	No situations have been identified in which a visualisation has been considered necessary for the preliminary assessment of likely

Summary of NPS requirement	How and where considered in the PEIR
	impacts and effects resulting from changes within the settings of heritage assets. Views towards the Project from and across heritage assets already incorporate structures associated with an operational international airport. Although the Project would result in an increase in in the number of such structures, there are no instances where this would represent a change within the setting of a heritage asset of such a scale that the magnitude of impact on that asset would be any greater than negligible.
The applicant is encouraged, where opportunities exist, to prepare proposals which can make a positive contribution to the historic environment, and to consider how their scheme takes account of the significance of heritage assets affected. This can include, where possible: ▪ Enhancing, through a range of measures such as sensitive design, the significance of heritage assets or setting affected: ▪ Considering measures that address those heritage assets that are at risk, or which may become at risk, as a result of the scheme; and ▪ Considering how visual or noise impacts can affect heritage assets, and whether there may be opportunities to enhance access to or interpretation, understanding and appreciation of the heritage assets affected by the scheme. Careful consideration in preparing the scheme will be required on whether the impacts on the historic environment will be direct or indirect, temporary or permanent (paragraph 195).	Opportunities for enhancing the significance of heritage assets have been considered. Where such opportunities are possible, these are described in Section 7.8 of this chapter. No heritage assets currently at risk would be affected by the Project, nor would any heritage assets become at risk as a result of the Project.
The applicant should look for opportunities for new development within Conservation Areas and World Heritage Sites, and within the setting of heritage assets, to enhance and better reveal their significance (paragraph 5.208).	Opportunities for enhancing the significance of heritage assets have been considered. Where such opportunities are possible, these are described in Section 7.8 of this chapter.
National Networks NPS	
Where the development is subject to EIA the applicant should undertake an assessment of any likely significant heritage impacts of the proposed project as part of the Environmental Impact Assessment and describe these in the environmental statement (paragraph 5.126).	The impact of the Project on the significance of heritage assets is described in Section 7.9 of this chapter. An updated assessment of impacts will be presented in the ES which will form part of the application for development consent.

Summary of NPS requirement	How and where considered in the PEIR
The applicant should describe the significance of any heritage assets affected, including any contribution made by their setting. The level of detail should be proportionate to the asset's importance and no more than is sufficient to understand the potential impact of the proposal on their significance (paragraph 5.127).	The description of the significance of the assets affected by the Project, and the contribution of their setting to that significance, is presented within Appendix 7.6.1: Historic Environment Baseline Report and summarised within Section 7.6 of this chapter.
Where a site on which development is proposed includes or has the potential to include heritage assets with archaeological interest, the applicant should include an appropriate desk-based assessment and, where necessary, a field evaluation (paragraph 5.127).	The desk-based assessment and a summary of the results of field evaluations are presented within Appendix 7.6.1: Historic Environment Baseline Report and summarised within Section 7.6 of this chapter.
Applicants should look for opportunities for new development within Conservation Areas and World Heritage Sites, and within the setting of heritage assets, to enhance or better reveal their significance (paragraph 5.137).	Opportunities for enhancing the significance of heritage assets have been considered. Where such opportunities are possible, these are described in Section 7.8 of this chapter.

National Planning Policy Framework

7.2.6 The National Planning Policy Framework (NPPF) (Ministry of Housing, Community and Local Government, 2021) sets out the planning policies for England. Policies regarding the historic environment are set out in Chapter 16 of the NPPF and further details of these policies are provided in Section 2 of Appendix 7.6.1: Historic Environment Baseline Report.

7.2.7 The NPPF provides the following definitions which are relevant to this chapter (Annex 2: Glossary).

- **Heritage asset:** A building, monument, site, place, area or landscape identified as having a degree of significance meriting consideration in planning decisions, because of its heritage interest. It includes designated heritage assets and assets identified by the local planning authority.
- **Designated heritage asset:** A World Heritage Site, Scheduled Monument, Listed Building, Protected Wreck Site, Registered Park and Garden, Registered Battlefield or Conservation Area designated under the relevant legislation.
- **Setting of a heritage asset:** The surroundings in which a heritage asset is experienced. Its extent is not fixed and may change as the asset and its surroundings evolve. Elements of a setting may make a positive or negative contribution to the significance of an asset, may affect the ability to appreciate that significance or may be neutral.
- **Significance (for heritage policy):** The value of a heritage asset to this and future generations because of its heritage interest. The interest may be archaeological, architectural, artistic or historic. Significance derives not only from a heritage asset's physical presence, but also from its setting. For World Heritage Sites, the cultural value described within each site's Statement of Outstanding Universal Value forms part of its significance.

7.2.8 The National Planning Practice Guidance (NPPG) (Ministry of Housing, Communities and Local Government, 2019) supports the NPPF and provides guidance across a range of topic areas. The

NPPG provides advice on specific issues such as '*What is 'significanc*e' and '*What is the setting of a heritage asset and how should it be taken into account?*'. Further details of this guidance are provided in Section 2 of Appendix 7.6.1: Historic Environment Baseline Report.

Local Planning Policy

7.2.9 Gatwick Airport lies within the administrative area of Crawley Borough Council and adjacent to the boundaries of Mole Valley District Council to the north west, Reigate and Banstead Borough Council to the north east and Horsham District Council to the south west. The administrative area of Tandridge District Council is located approximately 1.9 km to the east of Gatwick Airport, while Mid Sussex District Council lies approximately 2 km to the south east. Gatwick Airport is located in the county of West Sussex and immediately adjacent to the bordering county of Surrey.

7.2.10 The relevant local planning policies applicable to the historic environment based on the extent of the study areas for this assessment are summarised in Table 7.2.2 with further details provided in Section 2 of Appendix 7.6.1: Historic Environment Baseline Report.

Table 7.2.2: Local Planning Policy

Administrative Area	Plan	Policy
Adopted Policy		
Crawley	Crawley 2030: Crawley Borough Local Plan 2015-2030	Policy CH12: Heritage Assets
		Policy CH13: Conservation Areas
		Policy CH15: Listed Buildings and Structures
		Policy CH16: Locally Listed Buildings
		Policy CH17: Historic Parks and Gardens
Reigate and Banstead	Reigate and Banstead Development Management Plan (2019)	Policy NHE9: Heritage Assets
	Reigate and Banstead Local Plan: Core Strategy 2014	Policy CS4: Valued Townscapes and the Historic Environment
Mole Valley	Mole Valley Core Strategy (adopted 2009)	Policy CS 14: Townscape, Urban Design and the Historic Environment
	Mole Valley Local Plan 2000 – 'saved' policies	Policy ENV23: Respect for Setting
		Policy ENV39: Development in Conservation Areas
		Policy ENV47: Historic Parks and Gardens
		Policy ENV49: Areas of High Archaeological Potential
		Policy ENV50: Unidentified Archaeological Sites
		Policy ENV51: Archaeological Discoveries during Development
Tandridge	Tandridge Local Plan Part 2: Detailed Policies	Policy DP20: Heritage Assets

Administrative Area	Plan	Policy
	2014-2019 (adopted 2014)	
Mid Sussex	Mid Sussex District Plan 2014-2031 (adopted 2018)	Policy DP34: Listed Buildings and Other Heritage Assets
		Policy DP35: Conservation Areas
		Policy DP36: Historic Parks and Gardens
Horsham	Horsham District Planning Framework (2015)	Policy 34: Historic Assets and Managing Change in the Historic Environment
Emerging Policy		
Crawley	Draft Crawley Borough Local Plan 2021-2037 (draft January 2021)	Policy HA1: Heritage Assets
		Policy HA2: Conservation Areas
		Policy HA3: Areas of Special Local Character
		Policy HA4: Listed Buildings and Structures
		Policy HA5: Locally Listed Buildings
		Policy HA6: Historic Parks and Gardens
		Policy HA7: Heritage Assets of Archaeological Interest
Mole Valley	Future Mole Valley 2018-2033 (Regulation 18 consultation draft)	Policy EN6: Conservation and Enhancement of Heritage Assets
Tandridge	Our Local Plan: 2033 (draft January 2019) – Tandridge District	Policy TLP43: Historic Environment
Horsham	Horsham District Local Plan 2019-2036 (Regulation 18 consultation draft)	Policy 35: Heritage Assets and Managing change in the Historic Environment

7.3. Consultation and Engagement

7.3.1 In September 2019, GAL submitted a Scoping Report (GAL, 2019) to the Planning Inspectorate, which described the scope and methodology for the technical studies being undertaken to provide an assessment of any likely significant effects and, where necessary, to determine suitable mitigation measures for the construction and operational phases of the Project. It also described those topics or sub-topics which are proposed to be scoped out of the EIA process and provided justification as to why the Project would not have the potential to give rise to significant environmental effects in these areas.

7.3.2 Following consultation with the appropriate statutory bodies, the Planning Inspectorate (on behalf of the Secretary of State) provided a Scoping Opinion on 11 October 2019 (Planning Inspectorate, 2019).

7.3.3 Key issues raised during the scoping process specific to the historic environment are listed in Table 7.3.1, together with details of how these issues have been addressed within the PEIR. The table shows the responses from the Planning Inspectorate; responses from other stakeholders are presented in Appendix 7.3.1: Summary of Stakeholder Scoping Responses for Historic Environment.

Table 7.3.1: Summary of Scoping Responses

Details	How/where addressed in PEIR
Planning Inspectorate	
The Scoping Report does not clearly define which 'urbanised areas' are proposed to be scoped out of the ES. The Inspectorate notes that both Horley and Crawley lie within the 3 km study area proposed for heritage assets. Further, this 3 km study area seems to conflict with the 5 km study area proposed in the landscape assessment without justification as to why these are different. The Inspectorate considers that there may be impacts to the settings of heritage assets from the Proposed Development including those from increases in airborne noise. The Inspectorate does not agree to scope such matters out and expects that the ES should include an assessment of likely significant effects on such receptors particularly where airborne noise would affect the setting. (PINS ID 4.1.1)	Further information on assets scoped out of the assessment is provided in Appendix 7.6.1: Historic Environment Baseline Report. Section 7.9 of this chapter provides an assessment of impacts and effects on all assets for which such assessment is considered necessary. The 3 km study area for the assessment of effects on designated heritage assets as a result of changes within their settings differs from the 5 km study area in the landscape assessment as the topics use different methodologies to assess impacts and effects. For historic environment the focus is on understanding how changes within the setting of a heritage asset could affect the significance of the asset. Given the baseline situation of an operational international airport which already forms part of the setting of heritage assets in the area, it is considered unlikely that changes arising from the Project (other than those associated with air noise) could result in significant effects with regard to heritage assets located more than 3 km from the Project site boundary. The study area for the assessment of effects resulting from changes in air noise is based on the predicted noise change footprint rather than a predefined distance from the Project site boundary. This is described within Appendix 7.6.1: Historic Environment Baseline Report and is based on guidance cited in the Airports National Policy Statement (Department for Transport, 2018).
The ES should also assess potential effects associated with the provision of noise insulation or ventilation measures within heritage assets throughout the study area and where this would be required. The Applicant	Noise effects are discussed in Chapter 14: Noise and Vibration, with the details of the proposed noise insulation schemes discussed in Section 14.8 and the proposed Noise Insulation Scheme zones identified in

Details	How/where addressed in PEIR
should make effort to agree the relevant receptors for the assessment with relevant consultation bodies. (PINS ID 4.1.1)	Figure 14.8.1. The schemes are available to property owners and/or occupiers but are not compulsory. Where noise insulation or ventilation measures are proposed for a historic building, the local authority's Conservation Officer would be consulted, and applications would be submitted for any consents that may be required. The ES will include the identification of the number and locations of listed buildings within the proposed Noise Insulation Scheme zones.
The assessment in the ES should have regard to relevant guidance documents including: Sussex Archaeological Standards (2019), and non-statutory local archaeological standards used in providing development management advice by East Sussex County Council and West Sussex County Council. (PINS ID 4.1.3)	This document is now included within the list of guidance documents described and discussed within Appendix 7.6.1: Historic Environment Baseline Report.
The Inspectorate recommends that the data used to inform the detailed Historic Environment Desk Based Assessment (DBA) should include full summaries of the findings of the two archaeological investigations by the Applicant for the New Pollution Lagoon (Fig. 7.5.1) and Flood Alleviation Reservoir, including the Late Iron Age cremation cemetery, (to the south of Crawley Sewage Works). The Historic Environment DBA should also include an appraisal of the geoarchaeological potential of the site in relation to the Proposed Development. (PINS ID 4.1.4)	Detailed summaries of the results of the programmes of archaeological work at these two sites are presented within Appendix 7.6.1: Historic Environment Baseline Report. The potential for deposits of geoarchaeological and palaeoenvironmental interest to be present within these areas is also discussed in Appendix 7.6.1: Historic Environment Baseline Report.
The Scoping Report proposes a 1 km study area for the archaeological element of the desk-based assessment but does not explain why this is relevant having regard to the extent of the impacts from the Proposed Development. The Inspectorate is concerned this may not be sufficient to address the full extent of impacts likely to result in significant effects. The Inspectorate recommends that the study area is established relevant to the extent of the impacts and that effort is made to agree the approach with relevant consultation bodies. (PINS ID 4.1.5)	The defined study area for non-designated heritage assets (including archaeological sites) extends for 1 km from the Project site boundary. This provides adequate context for understanding the known and potential archaeological resource within the Project site. The discussion of archaeological potential presented in Appendix 7.6.1: Historic Environment Baseline Report covers a much wider area of south east England.
The Scoping Report proposes that the study area for designated heritage assets will be 3 km, but that some heritage assets outside of a 3 km study area may need to be considered including those with designed views	The assessment of effects on the significance of designated heritage assets resulting from changes within their settings is based on a study area which extends for 3 km from the Project site boundary. The

Details	How/where addressed in PEIR
towards the airport, or those which have a particular iconic status. The Applicant should also consider the inclusion of non-designated heritage assets in the assessment. (PINS ID 4.1.6)	Zone of Theoretical Visibility (ZTV) established for the Project is also taken into account when assessing visual changes within settings of heritage assets. The ZTV has been established for the Landscape, Townscape and Visual Assessment undertaken with regard to the Project. Through the Scoping Report, advice was sought as to whether any specific heritage assets beyond the 3 km study area should also be assessed – no such assets were identified within the Scoping Opinion. The assessment includes non-designated heritage assets including locally listed buildings.
The Inspectorate acknowledges the commitment made in the Scoping Report to identifying relevant heritage assets with relevant consultation bodies and recommends that this be agreed at an early stage in the assessment. The Applicant should cross refer to the finalised ZTV of the Proposed Development to assist with the identification of relevant assets. (PINS ID 4.1.6)	The ZTV established for the Project has been taken into account when assessing visual changes within settings of heritage assets.
The locations of all heritage assets considered in the assessment should be shown on appropriate figures with cross referencing by number or label to the relevant data in the text or tables. Data sources should be stated. (PINS ID 4.1.6)	Figures are provided within Appendix 7.6.1: Historic Environment Baseline Report and within this chapter which show the locations of all assessed heritage assets. Data sources are identified within Appendix 7.6.1: Historic Environment Baseline Report.
The Applicant should make effort to agree the study area with relevant consultation bodies having regard to the findings of other relevant aspects and matters, eg the noise assessment and the study area used for the assessment of tranquility effects in the Landscape, Townscape and Visual Resources assessment. (PINS ID 4.1.7) In this regard, the Inspectorate notes that tranquility mapping produced by the Campaign to Protect Rural England (CPRE) as referred to by the Applicant at paragraph 7.1.22 is not a predictive tool and its publication dates back to 2007. The extent to which this mapping informs the baseline assessment alongside other methodological guidance should be made clear. (PINS ID 4.1.7)	The study area for the assessment of effects resulting from changes in air noise derives from the methodology set out in in a report produced for English Heritage and prescribed in the Airports National Policy Statement. This is described within Appendix 7.6.1: Historic Environment Baseline Report and has been prepared in conjunction with the noise and the landscape assessments. The CPRE tranquility mapping has not been used in the assessment of effects on the significance of heritage assets resulting from changes in air noise.
The assessment of impacts to built heritage and historic areas during the construction phase should	Vibration from construction activities would be minimised through best practices such as plant

Details	How/where addressed in PEIR
also include the assessment of potential significant effects resulting from vibration. (PINS ID 4.1.8)	suppression. The assessment on impacts arising from vibration during construction works has not been undertaken for the PEIR but will be presented within the ES.
The assessment of construction, demolition and operational impacts should include settlement level /conservation area impacts at Charlwood due to its concentration of assets and its proximity to the airport, in particular to the repositioned northern runway. Impacts to the conservation area of Horley should also be considered. (PINS ID 4.1.8)	Assessment of the impacts and effects on the Charlwood Conservation Area and on individual designated heritage assets within Charlwood, and on the Church Road Conservation Area at Horley, are considered within Sections 7.6 and 7.9 of this chapter.
Effects on the settings of heritage assets should be assessed in accordance with The Setting of Heritage Assets: Historic Environment Good Practice Advice in Planning Note 3 (Historic England, 2017). (PINS ID 4.1.8)	Historic Environment Good Practice Advice in Planning Note 3 is one of the methodological sources drawn on in the assessment presented in Section 7.9 of this chapter, and the assessment has been undertaken in accordance with this guidance.
Effects from road traffic associated with the Proposed Development on heritage assets should also be included in the assessment. (PINS ID 4.1.8)	Effects resulting from road traffic changes have been included within the assessment presented in Section 7.9 of this chapter.
The Scoping Report summarises the areas which may require archaeological investigation. The Inspectorate does not regard the summary in the text at 7.1.31 as definitive and expects that the Applicant will make efforts to agree the detailed scope and extent of the proposed investigations with relevant consultation bodies. The Inspectorate notes that in Chapter 5: Project Description, a number of instances are cited where the Proposed Development may extend significantly below ground level (5.2.18, 5.2.20, 5.2.22, 5.2.28, 5.2.62) and draws attention that even where land is previously disturbed, archaeological investigation may be required if the proposed excavation is below ground levels previously disturbed. Deeper deposits of potential geoarchaeological and palaeoenvironmental significance (eg late glacial channel deposits, alluvial deposits) may also survive below areas of previous heavy ground disturbance. The Applicant should make effort to agree the approach to assessing impacts on archaeological deposits with relevant consultation bodies. (PINS ID 4.1.9)	A programme of geophysical survey has been undertaken in order to further inform the understanding of archaeological potential at selected locations within the Project site. This was agreed in advance with the appropriate archaeological advisors to the local planning authorities. Further investigations will be undertaken ahead of the production of the ES – again all work would be agreed in advance with the appropriate archaeological advisors to the local planning authorities, as would any subsequent investigations carried out ahead of or during construction. The collation of baseline information, including data obtained through geophysical survey, has enabled the predictive modelling of zones of archaeological potential within the Project site. This is presented within Appendix 7.6.1: Historic Environment Baseline Report and it acknowledges the archaeological potential of areas that have been previously disturbed. The assessment presented in Section 7.9 of this chapter recognises that deposits of potential geoarchaeological and palaeoenvironmental interest may survive in areas previously disturbed and advises

Details	How/where addressed in PEIR
	that investigation of such locations may be undertaken. All work would be agreed in advance with the appropriate archaeological advisors to the local planning authorities, as would any subsequent investigations carried out ahead of or during construction.
The Applicant's intention is that a Written Scheme of Investigation will be agreed in advance with relevant consultation bodies. Where archaeological mitigation measures are proposed to be undertaken following the grant of the DCO, such measures should be appropriately secured. The Applicant should also make effort to agree the approach to the reporting of results and/or publication in relevant journal/s, with relevant consultation bodies. (PINS ID 4.1.10)	All work would be agreed in advance with the appropriate archaeological advisors to the local planning authorities through Written Schemes of Investigation. These would include details of the publication of the results of any archaeological investigations undertaken in connection with the Project.
The Inspectorate considers that the Applicant's approach to mitigation should emphasise the need to preserve heritage assets *in-situ*, where possible and appropriate. (PINS ID 4.1.10)	The *in-situ* preservation of heritage assets would be achieved through design wherever this is possible and appropriate.

7.3.4 The consultation and engagement with interested parties specific to the historic environment are listed in Table 7.3.2. No specific issues were raised which require addressing in this PEIR chapter.

Table 7.3.2: Summary of Consultation

Consultee	Date	Details	How/where addressed in PEIR
Historic England	14/06/2019	Meeting to inform Historic England of the Project. Historic England were advised of the approach to assessment of impacts and effects on the historic environment, including the proposed study areas.	Assessment methodology and the scope of the assessment is set out in Section 7.4 of this PEIR chapter.
Land Based Local Authority Topic Group	20/08/2019	The Topic Group was appraised of the approach to assessment of impacts and effects on the historic environment, including the proposed study areas.	Assessment methodology and the scope of the assessment is set out in Section 7.4 of this PEIR chapter.
Land Based Local Authority Topic Group	03/02/2020	The Topic Group was provided with updated information regarding the collation and presentation of historic environment baseline data, also progress on the application of the assessment methodologies.	The historic environment baseline data are presented in Appendix 7.6.1: Historic Environment Baseline Report. Assessment methodology is set out in Section 7.4 of this PEIR chapter.

Consultee	Date	Details	How/where addressed in PEIR
Historic England	26/02/2021	Meeting to advise Historic England of the approach to impacts on designated heritage assets arising from changes in air noise.	The assessment methodology for this issue is set out in Appendix 7.6.1: Historic Environment Baseline Report and in Section 7.4 of this PEIR chapter.
Historic England	30/07/2021	Meetings to advise Historic England of the outcomes of the collation and presentation of historic environment baseline data, with specific reference to the study areas including those established for the assessment of impacts on designated heritage assets arising from changes in air noise.	The historic environment baseline data are presented in Appendix 7.6.1: Historic Environment Baseline Report, along with an explanation of the study areas that have been used for the assessment of impacts on heritage assets.
Land Based Local Authority Topic Group	05/08/2021	The Topic Group was advised of the outcomes of the collation and presentation of historic environment baseline data, with specific reference to the study areas including those established for the assessment of impacts on designated heritage assets arising from changes in air noise.	The historic environment baseline data are presented in Appendix 7.6.1: Historic Environment Baseline Report, along with an explanation of the study areas that have been used for the assessment of impacts on heritage assets.

7.4. Assessment Methodology

Relevant Guidance

7.4.1 In addition to the NPPG, which is summarised in Section 7.2 above and in Section 2 of Appendix 7.6.1: Historic Environment Baseline Report, a number of other guidance documents are relevant to this chapter.

7.4.2 The Design Manual for Roads and Bridges (DMRB) (Highways England *et al*., 2020a) provides detailed guidance on Environmental Impact Assessment with regard to the historic environment. The methodology described below for the assessment of impacts and effects on heritage assets is derived from the preceding and current iterations of the DMRB methodology.

7.4.3 *Historic Environment Good Practice Advice in Planning 2: Managing Significance in Decision-Taking in the Historic Environment* was published by Historic England in March 2015. It provides detailed guidance on how the significance of heritage assets can be determined, and how decision-takers should assess proposals for developments which would affect this significance. Further details of this guidance document are provided in Section 2 of Appendix 7.6.1: Historic Environment Baseline Report.

7.4.4 The second edition of *Historic Environment Good Practice Advice in Planning 3: The Setting of Heritage Assets* was published by Historic England in December 2017. It provides detailed

guidance on understanding the concept of setting and how it may contribute the significance of heritage assets. Further details of this guidance document are provided in Section 2 of Appendix 7.6.1: Historic Environment Baseline Report.

7.4.5 Further advice on assessing the significance of heritage assets has been recently published by Historic England in their *Advice Note 12 Statements of Heritage Significance: Analysing Significance in Heritage Assets* (Historic England, 2019). This explains how significance should be assessed as part of a staged approach to decision-making.

7.4.6 Specifically, with regard to the issue of air noise when considering changes within the setting of heritage assets, guidance is provided within an English Heritage research report (*Aviation Noise Metric – Research on the Potential Noise impacts on the Historic Environment by Proposals for Airport Expansion in England*, Temple Group and Cotswold Archaeology, 2014) and also the Civil Aviation Authority document *Airspace Design: Guidance on the regulatory process for changing airspace design including community engagement requirements* (CAP 1616) (CAA, 2021). Further details of these guidance documents are provided in Section 2 of Appendix 7.6.1: Historic Environment Baseline Report.

7.4.7 Other guidance documents that have been considered in the assessment process include:

- Principles of Cultural Heritage Impact Assessment in the UK (Institute of Environmental Management and Assessment (IEMA), Institute of Historic Building Conservation (IHBC) and Chartered Institute for Archaeologists (CIfA), 2021).
- Standard and guidance for historic environment desk-based assessment (CIfA, 2014a).
- Standard and guidance for commissioning work or providing consultancy advice on archaeology and the historic environment (CIfA, 2014b).
- Standard and guidance for archaeological geophysical survey (CIfA, 2014c).
- Standard and guidance for archaeological field evaluation (CIfA, 2014d).
- Standard and guidance for the collection, documentation, conservation and research of archaeological materials (CIfA, 2014e).
- Standard and guidance for the collection, compilation, transfer and deposition of archaeological archives (CIfA, 2014f).
- Sussex Archaeological Standards (Chichester District Council *et al*., 2019).

Scope of the Assessment

7.4.8 The scope of this PEIR has been developed in consultation with relevant statutory and non-statutory consultees as detailed in Table 7.3.1 and Table 7.3.2. It comprises the assessment of the likely effects on all elements of the historic environment, including buried archaeological remains, historic buildings and historic areas.

7.4.9 Taking into account the scoping and consultation process, Table 7.4.1 summarises the issues considered as part of this assessment.

Table 7.4.1: Issues Considered within the Assessment

Activity	Potential Effects
Construction Phase (including Demolition): Buried Archaeology	
Construction and demolition activities (generally)	Loss of, or damage to, heritage assets as a result of construction activity (eg physical removal or disturbance of archaeological remains, where these are still present).
Construction of updated highways junctions	Loss of, or damage to, heritage assets as a result of construction of upgraded highway junctions (eg physical removal, disturbance, damage of potential archaeological remains).
Use of construction compounds and creation of mitigation areas beyond existing airport boundary	Loss of, or damage to, heritage assets as a result of instigation and use of construction compounds and creation of environmental mitigation/enhancement areas beyond the existing airport boundary. This includes works associated with drainage, such as excavation for new ponds or ground reduction for flood alleviation. Works to prepare the proposed construction compounds may result in loss of or damage to heritage assets. However, the site of the proposed main contractor compound is already developed (predominantly for surface parking), whilst the site of the proposed airfield satellite compound has been subject to previous archaeological examination as part of the Gatwick North West Zone development.
Construction Phase (including Demolition): Built Heritage and Historic Areas	
Construction and demolition activities	Effects resulting from changes within the settings of designated and non-designated heritage assets as a result of demolition and construction activity (including light and noise), construction of upgraded highway junctions and use of construction compounds. Effects resulting from demolition of non-designated buildings with identified heritage values.
Construction Phase (including Demolition): Historic Landscape	
Construction and demolition activities	Effects on the wider historic landscape as a result of construction activity, including construction of upgraded highway junctions, use of construction compounds and creation of mitigation/enhancement areas.
Operational Phase: Built Heritage and Historic Areas	
Use of airport, including upgraded highway junctions	Effects resulting from changes within the settings of designated and non-designated heritage assets as a result of operational activity (including light and noise). This includes consideration of potential air noise impacts that may occur as a result of increased flight numbers and/or changes in distribution of volumes of aircraft along established flight paths, as well as ground noise and road traffic noise.

Activity	Potential Effects
Operational Phase: Historic Landscape	
Use of airport, including upgraded highway junctions	Effects on the wider historic landscape.

7.4.10 Effects which are not considered likely to be significant have been scoped out of the assessment. A summary of the effects scoped out is presented in Table 7.4.2.

Table 7.4.2: Issues Scoped Out of the Assessment

Issue	Justification
Operational impacts on buried archaeological remains	Impacts on buried archaeological remains would potentially occur during construction. It is assumed that all such remains will be examined to the appropriate level ahead of construction and that little or nothing of archaeological interest would remain *in situ* to be affected by operational activities.
Impacts on designated heritage assets within the more urbanised areas of Horley and Crawley resulting from changes within their settings	The settings of such assets predominantly comprise the urban environment within which they are located. This aspect of their setting will not be affected by the Project and therefore there is no potential for a significant effect.

Study Areas

7.4.11 With regard to buried archaeological remains, the defined study area is a zone extending for 1 km in all directions from the Project site boundary. This is considered to be sufficient to allow the known archaeological remains within the Project site boundary to be placed into context, and for the potential for further (as yet unknown) archaeological remains to be present within the Project site boundary to be assessed. It is anticipated that the extent of this study area will be agreed with the relevant authorities through the process of consultation on the PEIR. Consideration of the archaeological potential also draws on the current knowledge of this topic over a wider area of the Weald.

7.4.12 There are two defined study areas for the examination of changes within the settings of heritage assets (including historic buildings and areas) that may result in harm to the significance of such assets. One is a zone extending for 3 km in all directions from the Project site boundary. Within this zone, heritage assets were examined against the ZTV established for the Project, and also information provided through site visits to examine the current settings of heritage assets. Consultation with relevant statutory bodies through the Scoping Report and the Scoping Opinion specifically examined whether or not there were any 'iconic' heritage assets outside the defined 3 km zone that should also be included within this part of the assessment – none were identified.

7.4.13 A second study area has been established in order to examine the impact of air noise and changes in flight routes which could result in harm to the significance of heritage assets as a result of changes within their settings. This study area has been established with regard to

predicted noise change footprints, using a methodology proposed in a report prepared for English Heritage (Temple Group and Cotswold Archaeology, 2014) and referenced in the Airports National Policy Statement (Department for Transport, 2018).

Methodology for Baseline Studies

Desk Study

7.4.14 Baseline data have been acquired from a number of sources, including the Historic Environment Records (HERs) for West Sussex and Surrey. Where the reports on previous archaeological investigations have not yet reached the HERs, contact has been made with organisations involved in those investigations and relevant information has been made available wherever possible.

7.4.15 The National Heritage List for England (NHLE) has been examined with regard to designated heritage assets, with additional material coming from the Historic England Archive. Information regarding Conservation Areas and locally listed buildings has been sourced from the appropriate local authorities.

7.4.16 Examination has been made of a range of historic maps in order to inform an understanding of the development of the landscape within and adjacent to the Project site boundary. The results of previous studies commissioned by Gatwick Airport Limited in relation to the previous second runway scheme have been examined, including a LiDAR assessment, an aerial photograph assessment and a detailed walkover survey.

7.4.17 Further details regarding all aspects of the baseline studies are presented in Appendix 7.6.1: Historic Environment Baseline Report.

Site-Specific Surveys

7.4.18 Archaeological geophysical surveys have been carried out at locations within the Project site boundary. These locations were predominantly areas of land outside the operational airport, mostly land in current agricultural use. The survey areas included land required as temporary construction land, as well as permanent land take for new development (see Figure 6.3.8 in Appendix 7.6.1: Historic Environment Baseline Report). The surveys were undertaken in August, September and October 2019.

7.4.19 The geophysical surveys comprised magnetometer survey (using fluxgate gradiometers) with the resulting data being presented in greyscale format as well as in interpretation plots that identify anomalies of potential archaeological interest. The results of the geophysical surveys are described in Appendix 7.6.1: Historic Environment Baseline Report, which also includes copies of the interpretation plots.

7.4.20 Additional walkover surveys and site visits have been undertaken to examine specific locations, including the examination of the current settings of numerous heritage assets. The location of the walkover surveys and the observations noted are set out in Appendix 7.6.1: Historic Environment Baseline Report.

7.4.21 Several visits have been undertaken to areas around Gatwick to understand how the existing settings of heritage assets may be affected by aircraft noise and also in relation to other noise sources, eg from road traffic. This has allowed a general understanding to be gained regarding

the noise environment of heritage assets so as to inform the assessment. These visits were undertaken in 2019, ie before the Covid-19 pandemic, so the results are representative of the pre-pandemic levels of aircraft activity.

Assessment Criteria and Assignment of Significance

7.4.22 The significance of an effect is determined based on the sensitivity or value of a receptor and the magnitude of an impact. This section describes the criteria applied in this chapter to characterise the sensitivity of receptors and magnitude of potential impacts. The terms used to define sensitivity/value (of receptors) and magnitude (of impact) are based on, and have been adapted from, those used in the preceding and current iterations of the Design Manual for Roads and Bridges (DMRB) methodology (Highways England *et al*., 2020b), which is described in further detail in Chapter 6: Approach to Environmental Assessment. They also take account of guidance published by the International Council on Monuments and Sites (ICOMOS, 2011).

Receptor Sensitivity/Value

7.4.23 Table 7.4.3 presents the definitions of sensitivity or value which are applied to heritage assets. The table combines buried archaeological remains; historic buildings; and historic landscapes.

Table 7.4.3: Sensitivity/Value Criteria

Sensitivity / Value	Definition
Very High	Heritage assets of international importance. World Heritage Sites and the individual attributes that convey their Outstanding Universal Value. Areas associated with intangible historic activities and areas with associations with particular innovations, scientific developments, movements or individuals of global importance. Assets that can contribute significantly to acknowledged international research objectives.
High	Heritage assets of national importance. Scheduled Monuments, Listed Buildings (Grade I, II*), Registered Historic Parks and Gardens (Grade I, II*), Registered Battlefields, Protected Wrecks, Protected Military Remains. Other listed buildings that can be shown to have exceptional qualities in their fabric or historical association not adequately reflected in the listing grade. Unscheduled sites and monuments of schedulable quality and/or importance including those discovered through the course of evaluation or mitigation. Archaeological assets that can contribute significantly to acknowledged national research objectives. Conservation Areas containing very important buildings. Undesignated structures of clear national importance. Designated and undesignated historic landscapes of outstanding interest, or high quality and importance and of demonstrable national value. Well-preserved historic landscapes, exhibiting considerable coherence, time-depth or other critical factors. Palaeogeographic features with a demonstrable high potential to include artefactual and/or palaeoenvironmental material, possibly as part of a prehistoric site or landscape.

Sensitivity / Value	Definition
	Undesignated sites of wrecked ships and aircraft that are demonstrably of equivalent archaeological importance to those already designated.
Medium	Heritage assets of regional importance. Conservation Areas, Grade II Listed Buildings and Registered Historic Parks and Gardens. Undesignated archaeological assets that can contribute to regional research objectives. Historic townscapes and landscapes with reasonable coherence, time-depth and other critical factor(s). Unlisted assets that can be shown to have exceptional qualities or historic association. Designated special historic landscapes. Undesignated historic landscapes that would justify special historic landscape designation, landscapes of regional value. Averagely well-preserved historic landscapes with reasonable coherence, time-depth or other critical factors. Prehistoric deposits with moderate potential to contribute to an understanding of the palaeoenvironment. Undesignated wrecks of ships or aircraft that have moderate potential based on a formal assessment of their importance in terms of build, use, loss, survival and investigation.
Low	Heritage assets with importance to local interest groups or that contribute to local research objectives. Locally Listed Buildings and Sites of Importance within a district level. Robust undesignated assets compromised by poor preservation and/or poor contextual associations. Robust undesignated historic landscapes. Historic landscapes with importance to local interest groups. Historic landscapes whose value is limited by poor preservation and/or poor survival of contextual associations. Prehistoric deposits with low potential to contribute to an understanding of the palaeoenvironment. Undesignated wrecks of ships or aircraft that have low potential based on a formal assessment of their importance in terms of build, use, loss, survival and investigation.
Negligible	Assets with little or no archaeological or historical interest due to poor preservation or survival. Buildings of little or no architectural or historic note; buildings of an intrusive character. Landscapes with little or no significant historical interest.
Unknown	The importance of the heritage asset cannot be ascertained from available evidence.

Magnitude of Impact

7.4.24 The magnitude of an impact is assessed without reference to the sensitivity or value of the heritage asset. In terms of the judgement of the magnitude of impact, this is based on the principle that preservation of the significance of the asset is preferred, and that total loss of significance (including loss resulting from substantial change within the setting) of the asset is least preferred.

7.4.25 With regard to buried archaeological remains, it is not always possible to assess the physical impact in terms of percentage loss, and therefore it can be important in such cases to try to assess the capacity of the heritage asset to retain its character and significance following any impact. Impacts resulting from changes within the setting of buried archaeological remains may also be difficult to assess as they do not involve physical loss of the resource.

7.4.26 Table 7.4.4 presents the criteria used to assess the magnitude of impact on heritage assets.

Table 7.4.4: Impact Magnitude Criteria

Magnitude of Impact	Definition
High	Change to most or all key elements of the heritage asset, or changes within the setting of the asset, such that the significance of the asset is lost or substantially harmed (Adverse).
	Change to most or all key elements of the heritage asset, or changes within the setting of the asset, such that the significance of the asset is substantially enhanced (Beneficial).
Medium	Change to elements of the heritage asset, or changes within the setting of the asset, such that the significance of the asset is clearly harmed (Adverse).
	Change to elements of the heritage asset, or changes within the setting of the asset, such that the significance of the asset is clearly enhanced (Beneficial).
Low	Change to elements of the heritage asset, or changes within the setting of the asset, such that the significance of the asset is slightly harmed (Adverse).
	Change to elements of the heritage asset, or changes within the setting of the asset, such that the significance of the asset is slightly enhanced (Beneficial).
Negligible	Change to elements of the heritage asset, or changes within the setting of the asset, such that the significance of the asset is barely affected (Adverse).
	Change to elements of the heritage asset, or changes within the setting of the asset, such that the significance of the asset is barely affected (Beneficial).
No Change	No changes to elements of the heritage asset, or within the setting of the asset.

Significance of Effect

7.4.27 The significance of the effect upon the historic environment has been determined by taking into account the sensitivity or value of the receptor and the magnitude of the impact. The method employed for this assessment is presented in Table 7.4.5. Where a range of significance levels are presented, the final assessment for each effect is based upon expert judgement.

7.4.28 In all cases, the evaluation of receptor sensitivity or value, impact magnitude and significance of effect has been informed by professional judgement and is underpinned by narrative to explain the conclusions reached.

7.4.29 For the purpose of this assessment, any effects with a significance level of minor or less are not considered to be significant in terms of the EIA Regulations. Effects should be considered to be adverse unless explicitly stated otherwise.

Table 7.4.5: Assessment Matrix

Sensitivity	Magnitude of Impact				
	No Change	Negligible	Low	Medium	High
Negligible	No change	Negligible	Negligible or Minor	Negligible or Minor	Minor
Low	No change	Negligible or Minor	Negligible or Minor	Minor	Minor or Moderate
Medium	No change	Negligible or Minor	Minor	Moderate	Moderate or Major
High	No change	Minor	Minor or Moderate	Moderate or Major	Major or Substantial
Very High	No change	Minor	Moderate or Major	Major or Substantial	Substantial

7.4.30 A description of the significance levels is provided in the bullets below.

- Substantial: Only adverse effects are normally assigned this level of significance. They represent key factors in the decision-making process. These effects are associated with heritage assets of international, national or regional importance that are likely to suffer a most damaging impact and loss of significance.
- Major: These beneficial or adverse effects are considered to be very important considerations and are likely to be material in the decision-making process.
- Moderate: These beneficial or adverse effects may be important but are not likely to be key decision-making factors. The cumulative effects of such factors may influence decision-making if they lead to an increase in the overall effect on a particular heritage asset or group of assets.
- Minor: These beneficial or adverse effects may be raised as local factors. They are unlikely to be critical in the decision-making process but are important in enhancing the subsequent design of the project.
- Negligible: No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

7.5. Assumptions and Limitations of the Assessment

7.5.1 All readily available data required for the assessment have been acquired, collated and critically examined.

7.5.2 One key limitation is with regard to the presence/absence, extent, nature and significance of buried archaeological remains within the Project site boundary. A number of non-intrusive methodologies have been utilised in order to gain as much information as possible, including geophysical and walkover surveys, also assessment of LiDAR data and aerial photographs.

7.5.3 Further investigation of land within the Project site boundary to establish or confirm its archaeological potential is planned to take place ahead of the production of the ES. The results of these investigations will be submitted in support of the application for development consent for the Project. The nature and extent of any investigation will depend on the current understanding of the archaeological potential of the specific area along with the proposed activities required for

the construction of the Project. All investigations would be in line with the guidance document *Sussex Archaeological Standards* (Chichester District Council *et al.,* 2019), and would be carried out in accordance with written methodologies agreed in advance with the appropriate archaeological advisors to the local planning authorities.

7.5.4 On this basis, no assumptions or limitations have therefore been identified in the preparation of this chapter with regard to the historic environment that would prevent an assessment of the potential effects being made, other than with regard to buried archaeological remains. For the latter, a worst case assessment has been made, assuming that buried archaeological remains (including, in some locations, remains of high sensitivity or value) are present.

7.5.5 The assessment of aircraft noise has been based on estimates of how the aircraft fleet will transition over time, based on assumptions around airlines' fleet procurement programmes and business models. The 'central case' used in this assessment is based on what is considered today to be the most likely rate of fleet transition. Any implications of a slower transition fleet will be reviewed for the ES.

7.6. Baseline Environment

Current Baseline Conditions

7.6.1 A detailed description of the historic environment baseline is presented within Appendix 7.6.1: Historic Environment Baseline Report, which should be read in conjunction with this chapter.

7.6.2 The current airport was developed within a historic landscape comprising dispersed farmsteads with small, irregular fields bounded by hedges that were often heavily wooded. Land use has historically fluctuated between arable and pastoral according to the available farming methods and the needs of society. Newly cleared land was usually set to arable, but depopulation often resulted in a reversion to pasture or rough grazing. Livestock were mainly cattle, although certain areas specialized in sheep farming. Locally, woodland provided timber and firewood for use in the ironworking industry, which was widespread in the medieval period and reached a peak during the 17th and 18th centuries.

7.6.3 The London and Brighton Railway opened in 1841 and was subsequently incorporated into the London, Brighton and South Coast Railway. This cut through the historic landscape on a north/south alignment and a station was provided at Horley. To the west of the railway, the former Gatwick Farm was replaced by a large house known as Gatwick. Land to the south east of Gatwick was purchased in 1890 by the Gatwick Race Course Company, who opened a race course in 1891 along with a new station on the adjacent railway. A grandstand was located at the south eastern end of the racecourse and was linked to the railway station by three covered walkways.

7.6.4 An airfield was licensed at Gatwick in 1930, although a plane had been based there from November 1928. The runway was adjacent to the racecourse and a licence for commercial flights was acquired in 1933. In 1935 a new railway station was opened further to the south and the following year the world's first circular passenger terminal was opened, linked to the new station by a subway approximately 130 yards in length. The terminal and part of the subway are still present but are outside the current operational airport – the former is a Grade II* listed building known as The Beehive.

7.6.5 During World War Two the airfield was requisitioned by the Air Ministry and used by the RAF, with further requisitioning that included part of the racecourse. After the war the airfield was retained under requisition and operated for civilian use. The country house known as Gatwick was demolished in 1950, and in the same decade Gatwick was substantially expanded to become the newest airport for London; it was further enlarged in 1962.

7.6.6 The land within the Project site boundary is predominantly occupied by the operational airport within which very little remains of the preceding historic landscape. However, there are three designated heritage assets wholly within the Project site boundary (Figure 7.6.2). These comprise the Grade II* listed Charlwood Park Farmhouse (Site 27) in the north western part of the Project site, along with Edgeworth House (Site 133) and Wing House (Site 134), both listed at Grade II, in the eastern part of the Project site.

7.6.7 Charlwood Park Farmhouse (Site 27) is a timber-framed hall house of 15th century date, with later additions and amendments. In the 19th century it was the home farm for the Charlwood Park estate; the main house and the park were located further to the east and have been completely lost to the expanding airport. The former farmhouse is located just outside the current airport perimeter fence and is in use as a nursery school. A garden extends around the western, northern and eastern sides of the former farmhouse, beyond which is modern surface car parking for the airport. To the south is an area of landscape planting adjacent to the realigned River Mole, with the Sussex Border Path running alongside the river and passing to the south and east of the farmhouse. There is some noise from planes taking off and landing, but this is not particularly obtrusive.

7.6.8 Wing House (Site 134) and Edgeworth House (Site 133) are separately listed at Grade II but are conjoined. Edgeworth House may be slightly earlier in date (15th or early 16th century), with Wing House being mid-16th century. The two buildings formerly represented separate elements of a property known as Edgeworth that was accessed via a driveway leading east to the B2036 Balcombe Road. This relationship no longer exists, and the two listed buildings are located within an area of surface car parks and modern buildings associated with the operational use of the airport, including the adjacent Marriot Hotel of which the historic buildings now form a part.

7.6.9 One Conservation Area is partially within the Project site boundary. This is the Church Road Conservation Area on the south western edge of Horley (Figure 7.6.2, Site 406). The eastern part of the Conservation Area comprises a number of historic buildings including the Grade I listed Church of St Bartholomew (Site 16) and the adjacent Grade II listed Ye Olde Six Bells public house (Site 370). To the west of the churchyard the Conservation Area takes in open land on either side of the River Mole, and it is this open land which falls partially within the Project site boundary.

7.6.10 Within 1 km of the Project site boundary there are a considerable number of designated heritage assets. These include two Scheduled Monuments: an area of former medieval settlement at Tinsley Green to the south east of the airport (Figure 7.6.2, Site 9); and a medieval moated manor house site known as Thunderfield Castle to the north east (Site 7).

7.6.11 Three Grade I listed churches are located within 1 km of the Project site boundary. The Church of St Bartholomew at Church Lane, Horley (Figure 7.6.2, Site 16) has already been mentioned (see paragraph 7.6.9 above) and is of 14th century date, restored in 1881 and with a south aisle added in 1901. The Church of St Nicholas is in the western part of the village of Charlwood, west of the airport (Site 14). This church is of Norman date and has surviving elements from the 13th,

14th and 15th centuries. The third one is the Church of St Bartholomew at Burstow (Site 13), east of the airport (and east of the M23 motorway). This example is of 12th century date, enlarged and remodelled in the 15th century and restored in 1884-95.

7.6.12 There are seven Grade II* listed buildings within 1 km of the Project site boundary. These include five to the south of the airport: Charlwood House (Figure 7.6.2, Site 23) which is a timber-framed house of early 17th century date now used as a nursery school; Gatwick Manor Inn on the east side of the A23 road which is another 15th century timber-framed house, now used as a hotel; the Church of St Michael and All Angels (Site 24) was built in 1867 as the parish church for Lowfield Heath, it is by the architect William Burgess in an early 13th century French Gothic style and is currently used by a Seventh Day Adventist congregation; Rowley Farmhouse (Site 22) has elements that date to the late 16th century and is located on a prominent position at the top of a small gravel hill; and The Beehive (Site 35) is the former airport passenger terminal built in 1934-36 and mentioned above, it is now outside the operational airport but is well-maintained and used as a business centre and restaurant.

7.6.13 The other two Grade II* listed buildings are within the village of Charlwood, to the west of the airport. The Providence Chapel on Chapel Road (Figure 7.6.2, Site 36) was erected in 1816 as a Non-conformist chapel. However, it was initially built in 1797 as the Guard Room of a military camp in Horsham used for training of troops to fight in the French Revolutionary War. The Manor House on Norwood Hill Road at Charlwood (Site 33) is a large hall house of 15th or 16th century date.

7.6.14 In addition to the remaining part of the Church Road (Horley) Conservation Area, there are three further Conservation Areas wholly or partially within 1 km of the Project site boundary. These are at Burstow to the east of the airport (Figure 7.6.2, Site 400), at Charlwood to the west of the airport (Site 397) and at Massets Road, Horley to the north of the airport (Site 398).

7.6.15 There are approximately 133 Grade II listed buildings or structures within 3 km of the Project site boundary (Figure 7.6.2). Many of these are located within the historic village of Charlwood to the west of the airport and within Horley to the north, whereas others are dispersed farmsteads and cottages in a more rural setting. Examination of the ZTV established for the Project has established that many of the Grade II listed buildings would have no intervisibility with any built element of the Project (see Figures 7.6.3 and 7.6.4, see also Chapter 8: Landscape, Townscape and Visual Resources). For those listed buildings where the ZTV indicates some potential for intervisibility, a programme of site visits has been undertaken to further review this potential and to establish the current setting of the buildings.

7.6.16 Figure 7.6.1 shows the locations of locally listed buildings within 1 km of the Project site boundary. The locally listed buildings are within Reigate and Banstead Borough, Crawley Borough and Tandridge District as these local authorities maintain a local list of historic buildings.

7.6.17 A number of the locally listed buildings are located within the urban areas of Horley and due to their location, the built elements of the Project would not represent a change within the settings of these assets.

7.6.18 One locally listed building is situated on the north western edge of the Project site boundary (Figure 7.6.1, Site 429). This is Gatwick Manor Lodge on the south side of Povey Cross Road, and it represents the only surviving structure associated with the former country house of Gatwick which replaced the earlier Gatwick Farm.

7.6.19 Elsewhere there are small numbers of locally listed buildings to the north east, east, and south east of the Project site boundary. These are identified within Appendix 7.6.1: Historic Environment Baseline Report.

7.6.20 As explained above, the defined study area for the examination of potential effects on designated heritage assets extends to a distance of 3 km from the Project site boundary. Designated heritage assets within 1-3 km of the Project site boundary, and within the ZTV established for the Project, include two Scheduled Monuments, three Grade II* listed buildings, one Conservation Area and a number of Grade II listed buildings (Figure 7.6.3).

7.6.21 Archaeological fieldwork has been undertaken at several locations within the Project site boundary. A comprehensive programme of archaeological investigation in the north western part of the airport (known as the Gatwick North West Zone) resulted in the identification of the remains of settlement activity dating from the Late Bronze Age. The area examined is shown on Figure 6.3.1 in Appendix 7.6.1: Historic Environment Baseline Report.

7.6.22 Another notable programme of archaeological work was undertaken ahead of and during construction of the Flood Storage (Control) Reservoir and the Pollution Control Lagoon to the south east of the airport (and east of the railway) (see Figure 6.3.3 in Appendix 7.6.1: Historic Environment Baseline Report). Numerous palaeochannels of the Gatwick Stream were identified here, along with evidence for activity in the Upper Palaeolithic, Mesolithic, Iron Age, Roman and medieval periods.

7.6.23 Archaeological discoveries within and around the Project site boundary have enabled the local planning authorities to identify areas of enhanced archaeological interest. This does not afford any specific protection to the identified area, but it draws the attention of planners and developers to the need for archaeological issues to be properly considered within the planning system. In West Sussex the areas of enhanced archaeological interest are known as Archaeological Notification Areas (ANAs) and are classed as Red or Amber according to their perceived importance. In Surrey the areas of enhanced archaeological interest are known as Areas of High Archaeological Potential (AHAPs) and also County Sites of Archaeological Interest (CSAIs). The locations of all ANAs, AHAPs and CSAIs within 1 km of the Project site boundary are indicated on Figure 7.6.1.

7.6.24 Within the Project site boundary are four Red ANAs and one AHAP. Along the north western part of the Project site boundary is a Red ANA in the vicinity of the Grade II* listed Charlwood Park Farmhouse. This ANA (Site 487) has been principally identified on the basis that the Late Bronze Age settlement examined to the east of here (within the Gatwick North West Zone) could extend further west.

7.6.25 A second Red ANA has been identified to the east of the railway, in an area predominantly used now as surface car parking but also taking in the Pollution Control Lagoon (Site 485). This relates to antiquarian evidence for a Roman settlement in the area of the former Horley Land Farm. The third Red ANA within the Project site boundary is to the south of Site 485 (Site 484) and has been principally identified with regard to a group of Iron Age cremation burials identified during the archaeological work associated with construction works adjacent to the Flood Storage (Control) Reservoir. A fourth Red ANA is located in the south western corner of the Project site boundary (Site 480). This is the site of the former Park Farm (or Park House Farm) which was indicated on a map of 1768 and survived into the early part of the 20th century.

7.6.26 The Surrey AHAP is only partially within the Project site boundary. This is on the north side of the airport, just to the west of the railway (Site 498). It relates to the antiquarian discovery of prehistoric flintwork, Late Iron Age cremation burials, and Roman pottery and coins. This land is now used as a staff car park.

7.6.27 There are several additional Red and Amber ANAs within 1 km of the Project site boundary. These include a Red ANA immediately south of the airport which is associated with a former windmill and miller's cottage at Lowfield Heath (Site 481) and a second one just to the west which is associated with the possible moated site of the Grade II* listed Charlwood House (Site 479). A smaller Red ANA to the east of the Lowfield Heath Windmill ANA is based around the Grade II* listed Church of St Michael and All Angels (Site 489) whilst to the south is another Red ANA; this one has been identified with regard to the medieval moated site of Gatwick Manor Inn (Site 482).

7.6.28 To the west of the airport is a large Red ANA which is an area of possible mine pits (for iron ore) and other landscape features (Site 486). An even larger Red ANA to the south, and mostly more than 1 km from the Project site boundary, covers the area of a medieval moated site at Ifield Court as well as remains associated with ironworking (Site 478).

7.6.29 A large Red ANA at Tinsley Green to the south east of the airport (Site 483) is associated with the remains of medieval settlement and ironworking, whilst a nearby smaller Red ANA relates to an area of medieval earthworks at Toovies Farm (Site 490). An amber ANA has been identified around the Grade II* listed building (and former airport passenger terminal) known as The Beehive (Site 488).

7.6.30 There are two (Surrey) AHAPs at Charlwood, to the west of the airport. One of these relates to the historic core of the village (Site 493) whilst the second is associated with the adjacent and formerly separate settlement core of Charlwood Green (Site 494).

7.6.31 To the north of the airport is a group of AHAPs on the south west side of Horley. These include a possible moated enclosure (Site 492), the church and churchyard (Site 497), another (possibly) moated medieval manor at Court Lodge Farm (Site 496) and a moated site at Ringley Oak Cottage (Site 499).

7.6.32 East of the airport there are two AHAPs at Burstow. The larger eastern one (Site 501) includes the church and several other historic buildings, whilst a smaller western AHAP (Site 502) is associated with a medieval mound and homestead. To the north and on the western side of the M23 motorway, the area around the Scheduled Monument of Thunderfield Castle has been identified as a CSAI (Site 495).

7.6.33 The detailed examination of known archaeological sites within and adjacent to the Project site boundary that is presented within Appendix 7.6.1: Historic Environment Baseline Report has enabled the production of a figure which indicates Zones of Archaeological Potential (within the Project site boundary). This is included here as Figure 7.6.5 and it shows zones of high and medium potential in several locations, all of which are outside of, or peripheral to, the operational airport.

7.6.34 A programme of Historic Landscape Characterisation (HLC) has been undertaken for Sussex and also for Surrey (see Figures 4.1.4 and 4.1.5 in Appendix 7.6.1: Historic Environment Baseline Report). Overall, the HLC shows that the historic character of the remaining undeveloped land within the Project site boundary is typical of the Sussex Weald, with assarts (areas of forest

cleared for agriculture) coalescing to form informal fieldscapes and then some areas being formally inclosed. These former assarts can be identified by sinuous field boundaries and wide hedges, and their probable association with medieval farms. The dispersed settlements are gradually encroached upon by ribbon development along the transport routes whilst some ancient woodland has survived along with more recent plantations.

7.6.35 Section 5.4 of Appendix 7.6.1: Historic Environment Baseline Report explains the methodology used to produce the baseline for the assessment of impacts and effects on heritage assets arising from changes in air noise. The methodology is derived from a research report produced on behalf of English Heritage (Temple Group and Cotswold Archaeology, 2014).

7.6.36 The methodology utilised for this element of the assessment requires the establishment of predicted positive and negative noise change footprints, ie areas within which air noise is likely to change according to certain specified parameters), followed by the identification of noise-sensitive heritage assets within these predicted noise change footprints.

7.6.37 Application of the methodology resulted in the identification of three noise-sensitive designated heritage assets within the predicted negative noise change footprint (ie the area within which air noise would increase in line with the agreed parameters) and two noise-sensitive designated heritage assets within the predicted positive noise change footprint (ie the area within which air noise would decrease in line with the agreed parameters). The locations of these noise-sensitive designated heritage assets and the predicted noise change footprints are indicated on Figure 7.6.6.

7.6.38 The three noise-sensitive designated heritage assets within the predicted negative noise change footprint comprise: the Grade II listed Church of St John the Baptist (Site 872, NHLE 1378150); the Grade II listed Quaker Meeting House with attached cottage at Capel (Site 873, NHLE 1028737); and the relocated Grade II listed Lowfield Heath Windmill south west of Charlwood (Site 332, NHLE 1298883). The two noise-sensitive designated heritage assets within the predicted positive noise change footprint comprise the Grade II* listed Church of St Michael and All Angels at Lowfield Heath (Site 24, NHLE 1187081) and the adjacent Grade II listed Lowfield Heath War Memorial (Site 389, NHLE 1452793) which is located just within the north west corner of the churchyard.

Future Baseline Conditions

7.6.39 Future changes to the historic environment baseline could include additions to the list of designated heritage assets, eg additional designations of Scheduled Monuments, listed buildings etc. or amendments to the descriptions of the assets and/or the area covered by the designation.

7.6.40 Other changes could occur as a result of further information regarding archaeological sites, possibly through programmes of intrusive or non-intrusive fieldwork.

7.6.41 No changes in statutory legislation on historic environment issues are currently anticipated, although this may change at any time. Additional guidance may be issued by national statutory advisors or others, including guidance on the assessment process.

7.6.42 No significant change to the historic environment baseline in this area is anticipated to occur as a result of climate change. Drier weather in the summer months may lead to the discovery of as yet unknown archaeological sites that become visible as cropmarks or parchmarks. However,

this could also lead to some drying out of deposits (within palaeochannels) which are currently waterlogged or damp and this may result in some loss of significance of these deposits in terms of palaeoenvironmental potential.

7.6.43 A number of proposed or consented developments at Gatwick Airport would proceed in the short-term in the absence of the Project (as explained in Chapter 4: Existing Site and Operation). These include:

- Boeing hangar (now completed);
- extension to Pier 6;
- alternations to Taxiway Quebec;
- reconfiguration of aircraft stands;
- resurfacing of the main runway in accordance with the usual maintenance schedule; and
- replacement of the Instrument Landing System (ILS) localisers.
- multi-storey car park 4 (1,500 vehicles);
- multi-storey car park 7 (2,750 vehicles);
- use of robotics technology within existing long stay parking areas to increase capacity, resulting in an additional 2,500 spaces;
- highway improvements to North Terminal and South Terminal roundabouts, signalisation and signage;
- extension to the existing BLOC hotel (approximately 200 additional bedrooms); and
- reconfiguration of the existing Hilton hotel to provide 50 additional bedrooms.

7.6.44 For further details, see Chapter 4: Existing Site and Operation. These developments are unlikely to result in any change to the future baseline situation with regard to the historic environment.

7.6.45 As explained above (Section 7.5), further investigation of the archaeological potential of land within the Project site boundary is planned to take place ahead of the production of the ES that would be submitted in support of the application for development consent for the Project. The results of any such investigations would be incorporated into the historic environment baseline reported within the ES.

7.7. Key Project Parameters

7.7.1 The assessment has been based on the parameters identified within Chapter 5: Project Description.

7.7.2 Table 7.7.1 below identifies the key parameters where relevant to this assessment. Where options exist, the maximum design scenario selected is the one having the potential to result in the greatest effect on an identified receptor or receptor group. Effects of greater adverse significance are not predicted to arise should any other option identified in Chapter 5: Project Description be taken forward in the final design of the Project.

7.7.3 With regard to the dates used here for each phase, where the potential impacts are physical (such as loss of or damage to archaeological or palaeoenvironmental remains) the activity is included within the period in which the activity commences. This is because the impacts would occur at the start of the activity. Conversely, where the potential impacts are non-physical (change within the setting of a heritage asset), the activity is included within the period in which the activity concludes.

Table 7.7.1: Maximum Design Scenarios

Potential Impact	Maximum Design Scenario	Justification
Initial Construction Phase: 2024-2029		
Loss of, or damage to, buried archaeological or palaeoenvironmental remains	Flood compensation area: Museum Field lowering (3.5 metres deep)	Greatest depth of excavation
	Flood compensation area: East of Museum Field (3.5 metres deep)	
	Flood compensation area: car park X (2.5 metres deep)	
	Surface access satellite contractor compound, South Terminal (up to 2 hectares)	Greatest site area
Harm to the significance of a heritage asset as a result of change within its setting	Main contractor construction compound MA1 (up to 5 hectares, including infrastructure up to 30 metres high)	Greatest visual change
	Surface access satellite contractor compound, North Terminal (up to 1.6 hectares including infrastructure up to 15 metres high)	
	Airfield satellite contractor compound (up to 6 hectares including infrastructure up to 30 metres high)	
	Surface access satellite contractor compound, South Terminal (up to 2 hectares including infrastructure up to 15 metres high)	
	Relocated fire training ground, rig height up to 25 metres high within an area of up to 1.2 hectares	
	Relocated grounds maintenance facility up to 8 metres high within a compound measuring approximately 0.13 hectares	
	Relocated airfield Surface Transport facility up to 15 metres high within a compound measuring approximately 0.14 hectares	
	Satellite Airport Fire Service provision up to 15 metres high	
	Noise mitigation feature up to 10 metres high	
	South Terminal IDL extension up to 29 metres high covering an area of approximately 0.38 hectares	
	North Terminal baggage reclaim extension up to 7 m high covering an area of approximately 0.065 hectares	

Potential Impact	Maximum Design Scenario	Justification
	North Terminal IDL northern extension up to 32.5 metres high covering an area of approximately 0.42 hectares, southern extension up to 27 metres high covering an area of approximately 0.34 hectares	
	New hotel at the building compound adjacent to the car rental site up to 16.3 metres high	
	North Terminal Long Stay decked car park (phase 1) up to 11 metres high covering an area of approximately 13 hectares	
	Multi storey car park J up to 27 metres high covering an area of approximately 1 hectare	
	Pentagon Field decked car park up to 8 m high covering an area of approximately 8.8 hectares	
	Car parks X and V (decked) up to 7 metres high covering an area of approximately 6.9 hectares	
2030-2032		
Loss of, or damage to, buried archaeological or palaeoenvironmental remains	Surface access satellite contractor compound, Longbridge Roundabout (up to 0.65 hectares)	Greatest site area
Harm to the significance of a heritage asset as a result of change within its setting	Surface access satellite contractor compound, Longbridge Roundabout (up to 0.65 hectares including infrastructure up to 5 metres high)	Greatest visual change
	Relocated CARE facility (22 metres high buildings and 50 metres high flues) within a compound area of up to 1.76 hectares	
	Relocated Motor Transport facility up to 15 metres high covering an area of up to 1.56 hectares	
	North Terminal baggage hall extension up to 12.5 metres high covering an area of approximately 0.66 hectares	
	South Terminal hotel (at car park H) up to 27 metres high	
	Offices – 3 blocks each up to 27 metres high and covering an area of approximately 0.1 hectares	
	North Terminal Hotel (at car park Y) up to 27 metres high	

Potential Impact	Maximum Design Scenario	Justification
	North Terminal Long Stay decked car park (phase 2) up to 27 metres high	
	Car park H multi-storey phase 1 up to 27 metres high covering an area of approximately 0.5 hectares	
	Surface Access South Terminal improvements, M23 Spur/Airport Way raised 8 metres over existing South Terminal roundabout with new flyover 130 m long, Balcombe Road overbridge raised 2.2 metres	
	Surface Access North Terminal improvements, new elevated link from Airport Way approximately 200 metres long and up to 8 metres high	
2033-2038		
Loss of, or damage to, buried archaeological or palaeoenvironmental remains	Flood compensation area - Gatwick Stream (up to 5 metres deep)	Greatest depth of excavation
Harm to the significance of a heritage asset as a result of change within its setting	New Pier 7 up to 18 metres high covering an area of up to 10.1 hectares	Greatest visual change
	New hangar up to 32 metres high and covering an area of approximately 1.24 hectares	
	Car park Y multi storey up to 27 metres high covering an area of approximately 1.9 hectares	

7.8. Mitigation and Enhancement Measures Adopted as Part of the Project

7.8.1 A number of measures have been designed into the Project to reduce the potential for impacts on the historic environment. These are listed below in Table 7.8.1.

7.8.2 In respect of construction, standard good practice measures regarding noise, dust etc would be adopted and implemented through the Code of Construction Practice (CoCP). Further details of environmental management during construction are provided in Chapter 5: Project Description and the Outline CoCP provided at Appendix 5.3.1.

7.8.3 Mitigation against potential impacts to buried archaeological remains would principally comprise avoidance through design (ie relocation or micro-siting of proposed activities) or protection by placing material over the archaeological remains such that the impact of construction activities does not extend as far as the remains. The placement of materials may be permanent or may be temporary, with the materials being removed following completion of the construction activities. For example, at the contractor compounds on undeveloped ground, it may be possible to avoid

stripping of soils in some of the materials laydown areas. Instead, geotextile matting (or an equivalent) would be placed on the topsoil and a layer of crushed stone would be added.

7.8.4 As explained above (Section 7.5), a programme of further archaeological investigation of the archaeological potential of land within the Project site boundary is planned to take place ahead of the production of the ES. The scope of these investigations will be agreed with the archaeological advisors to the relevant planning authority. The results of these investigations will be examined, and any opportunities for mitigation through avoidance or reduction of impact on buried archaeological remains will be identified and considered alongside other factors influencing the design process.

Table 7.8.1: Mitigation and Enhancement Measures

Measures Adopted as Part of the Project	Justification
Mitigation	
A vegetation retention strategy for all elements of the Project that coincide with, or lie immediately adjacent to, existing significant vegetation including hedgerows, woodland and trees that may be affected during the construction phase or during maintenance activities.	To eliminate or reduce any potential harm to the significance of a heritage asset as a result of change within its setting.
Proposed woodland and tree planting.	
Proposed earth shaping, embankments, cuttings or bunds.	
Proposed fences, walls or barriers.	
Measures designed to reduce noise (as described in Section 14.8. of Chapter 14: Noise and Vibration).	
Enhancement	
Removal of detracting elements within the setting of a heritage asset and replacement with elements that make a positive or neutral contribution to the significance of the asset. For example, the partial removal of the car park and replacement with appropriate planting adjacent to the Grade II* listed Charlwood Park Farmhouse.	To enable a greater ability to appreciate and understand the significance of a heritage asset as a result of change within its setting.

Offsetting

7.8.5 Where programmes of archaeological investigation (including dissemination of results and the placement of acquired materials in suitable archives) are undertaken post-consent (ahead of and during construction), this is not considered to be mitigation as it does not avoid or reduce the magnitude of impact or the significance of effect. Rather it is considered that the programmes of archaeological investigation are a means of 'offsetting' or 'remedying' those impacts and effects (see Thomas, 2019). The same logic applies to the recording of historic buildings ahead of demolition.

7.9. Assessment of Effects

7.9.1 With regard to the assessment periods used here, where the potential impacts are physical (such as loss of or damage to archaeological or palaeoenvironmental remains) the activity is included within the assessment period in which the activity commences. This is because the impacts would occur at the start of the activity. Conversely, where the potential impacts are non-physical (change within the setting of a heritage asset), the activity is included within the assessment period in which the activity concludes. If any instances are identified where changes within the setting of a heritage asset would be substantially different (and more harmful to the significance of that asset) during construction than during the subsequent phases, details are provided below.

7.9.2 In each case the assessment takes account of mitigation that has been incorporated into the Project design, ie the stated effects are those that would occur with the designed-in mitigation in place.

Initial Construction Phase: 2024-2029

7.9.3 This section describes the effects on the historic environment that would arise as a result of construction activities only during the initial construction phase prior to the opening of the altered northern runway. Key effects are summarised in table format in the summary section at the end of the chapter (see Table 7.13.1).

7.9.4 Construction activities have the potential to impact directly on buried archaeological remains. Such impacts could occur during site clearance, groundworks or other construction activities that require ground disturbance.

Contractor Compounds

7.9.5 A number of locations within the Project site boundary have been identified as areas where contractor compounds are likely to be established.

Main Contractor Compound

7.9.6 The main contractor compound would be in the south eastern part of the operational airport. It is within an identified zone of low archaeological potential (Figure 7.6.5); the current nature of the area is concrete hardstanding used for parking, but formerly there were substantial hangars and other buildings here and the hardstanding was designed for the movement of planes. As a consequence, any archaeological remains that may have been present here are likely to have been heavily impacted and would now be in a highly degraded state. The magnitude of impact of establishing the contractor compound on buried archaeological remains would be negligible and the area is of negligible sensitivity or value. The consequent significance of effect would be **negligible**, which is not significant in terms of the EIA Regulations.

7.9.7 The establishment and use of the main contractor compound would not affect the significance of any heritage asset as a result of change within its setting due to the nature from the works and the distance to the assets. The magnitude of impact and significance of effect would therefore be **no change**.

Airfield Satellite Contractor Compound

7.9.8 The land proposed for the airfield satellite compound has been previously subject to archaeological investigation (as part of the Gatwick North West Zone), which established an

absence of buried archaeological remains, and the eastern half of this area has recently been used as a contractor compound during construction of the Boeing hangar. However, there is an identified higher level of potential in the western part of the proposed airfield satellite contractor compound for the presence of palaeochannels associated with the former alignment of the River Mole, as these could be at a level lower than that which was investigated by the previous archaeological work here. If palaeochannels are present, they would be of up to medium sensitivity or value. The impact of establishing the contractor compound would be of negligible magnitude (as works are unlikely to penetrate to the depth at which palaeochannels may be present) and the assessed significance of the effect would be **negligible**. This is not considered significant in terms of the EIA Regulations. If the methodology for the establishment of the compound includes works with the potential to impact on possible palaeochannels, an appropriate programme of investigation would be undertaken in order to offset any adverse effect.

7.9.9 The establishment and use of the airfield satellite compound would not affect the significance of any heritage asset as a result of change within its setting due to the nature of the works and the distance from the assets. The magnitude of impact and significance of effect would therefore be **no change**.

Surface Access Satellite Contractor Compound, South Terminal

7.9.10 The land proposed for this contractor compound is located to the north of the South Terminal roundabout at the junction of the M23 motorway spur and the A23 road and immediately east of the Brighton-London mainline railway. This land has not been previously developed.

7.9.11 A geophysical survey carried out for the Project found that the land here was not susceptible to this type of survey (ie reliable readings could not be obtained), with a high degree of signal interference. This is likely to be the result of attempts at soil improvement or possibly the dumping of materials to raise the ground level (see Figure 6.3.11 in Appendix 7.6.1: Historic Environment Baseline Report). However, the land immediately to the west (on the other side of the railway) is an Area of High Archaeological Potential identified on the basis of antiquarian finds including prehistoric flintwork, Late Iron Age cremation burials, and Roman pottery and coins. These discoveries are likely to relate to the construction of the railway (which opened in 1841). The possibility that archaeological activity may extend onto the area for the proposed contractor compound cannot be ruled out.

7.9.12 If present, archaeological remains similar to those found to the west are likely to be of up to medium sensitivity or value. Depending on the nature of the works required for establishment of the contractor compound, the magnitude of impact could be up to high and could be permanent. In this event, the consequent significance of effect could be up to **major adverse**, which is significant in terms of the EIA Regulations.

7.9.13 The programme of further archaeological investigation that would be undertaken ahead of the production of the ES (see Section 7.8 above) would include examination of this location. If archaeological remains of medium (or high) sensitivity or value are identified, it may be possible for appropriate mitigation (see paragraph 7.8.3) to be incorporated into the methodology for the establishment of the construction compound, such that the magnitude of impact would be reduced to negligible. The consequent significance of effect could be up to **minor adverse** (high sensitivity remains) or **negligible** (medium sensitivity remains), which is not significant in terms of the EIA Regulations. If the appropriate mitigation is not possible, a programme of further archaeological investigation would be undertaken in order to offset the adverse effect.

7.9.14 The establishment and use of the contractor compound to the north of the South Terminal roundabout would not affect the significance of any heritage asset as a result of change within its setting due to the nature of the works and the distance from the assets. The magnitude of impact and significance of effect would therefore be **no change**.

7.9.15 The establishment and use of the contractor compound to the north of the South Terminal roundabout would result in a change to the character of the historic landscape in this area. This is recorded in the Surrey Historic Landscape Characterisation (HLC) as Character Subtype 'Large regular fields with straight boundaries (parliamentary enclosure type' (see Figure 4.1.5 in Appendix 7.6.1: Historic Environment Baseline Report). This Subtype is relatively common in Surrey, but less common in the vicinity of Gatwick due to the amount of development in the area (including the airport). The contractor compound would occupy a small part of a larger block of this Subtype which extends north towards Horley. The historic landscape character is considered to be of low sensitivity or value, and the establishment and use of the contractor compound would represent a low magnitude of impact. The consequent significance of effect has been assessed as **negligible**, which is not significant in EIA terms.

Surface Access Satellite Contractor Compound, North Terminal

7.9.16 This contractor compound would be established within land currently used as a surface car park adjacent to the Premier Inn which is north west of the North Terminal roundabout on the A23 Airport Way. It is within an identified zone of low archaeological potential (Figure 7.6.5) on the basis of previous development activity leading to the establishment of the current surface car park. As a consequence, any archaeological remains that may have been present here are likely to have been heavily impacted and would now be in a highly degraded state. The magnitude of impact of establishing the contractor compound on buried archaeological remains would be negligible and the area is of negligible sensitivity or value. The consequent significance of effect would be **negligible**, which is not significant in terms of the EIA Regulations.

7.9.17 The establishment of the contractor compound to the north west of the North Terminal roundabout would not affect the significance of any heritage asset as a result of change within its setting. This is due to the nature of the works and the distance from any assets. The magnitude of impact and significance of effect would therefore be **no change**.

Flood Compensation Areas - Museum Field and East of Museum Field

7.9.18 The Project design includes several areas where flood compensation measures would be implemented (see Chapter 5: Project Description). One such area is located in the western part of the Project site on land known as Museum Field. The ground level within this field would be reduced and the drainage configured such that water could flow into here from the River Mole and then later be released back into the river as and when safe to do so.

7.9.19 Geophysical survey carried out here with regard to the Project identified several anomalies of potential archaeological interest (see Figure 6.3.10 in Appendix 7.6.1: Historic Environment Baseline Report). These included a possible sub-rectangular enclosure at the eastern edge of the field and extending beyond the survey area. The linear feature forming the west side of the enclosure was well-defined, and in the northern part it was mirrored by a parallel feature. This may represent a livestock drove or funnel along the northern side of the enclosure. Another possible enclosure was suggested by a shorter linear anomaly to the south west.

7.9.20 The programme of further archaeological investigation that would be undertaken ahead of the production of the ES (see Section 7.8 above) would include examination of this location. If the possible features represent enclosures of prehistoric or Roman date, then these are likely to be of low to medium sensitivity or value. Ground reduction to create a flood storage reservoir would result in a high magnitude of impact on archaeological remains (if present) and would be permanent. The consequent significance of effect would be up to **major adverse**, which is significant in terms of the EIA Regulations. An appropriate programme of archaeological investigation would be undertaken ahead of construction in order to further define and offset the effect.

7.9.21 To the east of the Museum Field is a small area of land that would be used to provide an additional flood compensation area. Parts of this area have been previously impacted during the diversion of the River Mole, however there may be areas that have not been previously disturbed. Those areas which have been previously disturbed fall within a zone of low archaeological potential, whilst the areas not previously disturbed are within a zone of medium archaeological potential (Figure 7.6.5). Any archaeological remains here would be of low to medium sensitivity or value. The impact of the proposed flood compensation measures would be of low magnitude and the consequent significance of effect would be up to **minor adverse**, which is not significant in terms of the EIA Regulations. An appropriate programme of archaeological investigation would be undertaken ahead of construction in order to further define and offset the effect.

7.9.22 The lowering of land within Museum Field and creation of a flood compensation area on adjacent land to the east would not affect the significance of any heritage asset as a result of change within its setting. This is due to the nature of the works and the distance from any assets. The magnitude of impact and significance of effect would therefore be **no change**.

7.9.23 The establishment of the flood compensation area at Museum Field would result in a change to the character of the historic landscape in this area. This is recorded in the Sussex Historic Landscape Characterisation (HLC) as Character Type ‘Assarts’ (see Figure 4.1.4 in Appendix 7.6.1: Historic Environment Baseline Report). This Type is relatively common in Sussex, but less common in the vicinity of Gatwick due to the amount of development in the area (including the airport). The flood compensation area would occupy part of a larger block of this Type which extends north. The historic landscape character is considered to be of low sensitivity or value, and the establishment of the flood compensation area would represent a negligible magnitude of impact as the field boundaries would remain intact. The consequent significance of effect has been assessed as **negligible**, which is not significant in EIA terms.

Flood Compensation Area – Car Park X

7.9.24 The implementation of the flood compensation area at car park X would require reductions in ground levels by up to 2.5 metres below the existing surface level. Previous disturbance associated with the construction of car park X is likely to have removed any buried archaeological remains that may have been present here and this is regarded as an area of low archaeological potential (Figure 7.6.5). However, there is some potential at the western end of car park X for the presence of palaeochannels associated with former routes of the River Mole, and deposits of geoarchaeological and/or palaeoenvironmental interest may survive. If present, such deposits are likely to be of low sensitivity or value. The ground reduction could result in a high magnitude of impact and would be permanent. The consequent significance of effect would be up to **moderate adverse**, which is significant in terms of the EIA Regulations. An appropriate

programme of investigation would be undertaken ahead of construction in order to further define and offset the effect.

7.9.25 The lowering of land within car park X would not affect the significance of any heritage asset as a result of change within its setting. This is due to the nature of the works and the distance from any assets. The magnitude of impact and significance of effect would therefore be **no change**.

Decked Car Parks X and V

7.9.26 The decked car parks X and V would be up to 7 metres high. However, these car parks would not be visible in views from or across the Grade II* listed building Charlwood House to the south (Figure 7.6.2, Site 23). This is due to the mature vegetation along each side of Charlwood Road in this area, particularly on the south side adjacent to the listed building. The sensitivity or value of this asset is high. The impact of the construction and operation of the decked car park on the significance of this Grade II* listed building would be no change and the consequent significance of effect would be **no change**, which is not significant in terms of the EIA Regulations. The same assessment applies to a number of Grade II listed buildings located to the south of Charlwood House ((Figure 7.6.2, Sites 388, 156, 296 and 334), except that for these assets their sensitivity or value is medium rather than high.

Spoil Placement and Decked Car Park - Pentagon Field

7.9.27 The spoil strategy for the Project envisages the placement of approximately 245,000 cubic metres of spoil at Pentagon Field, raising the ground here by between 2 metres and 4.5 metres. Placement of the spoil requires removal of topsoil but no further excavation. Following the placement and consolidation of the spoil, a decked car park will be constructed with a maximum height of 8 metres.

7.9.28 Geophysical survey carried out at Pentagon Field with regard to the Project did not identify anomalies of potential archaeological interest (see Figure 6.3.9 in Appendix 7.6.1: Historic Environment Baseline Report). However, further archaeological investigation is proposed here as the land is immediately east of a designated ANA. If present, archaeological remains similar to those encountered in the ANA are likely to be of up to medium sensitivity or value. The placement of spoil and construction of the decked car park would result in a high magnitude of impact on archaeological remains (if present) and would be permanent. The consequent significance of effect would be up to **major adverse**, which is significant in terms of the EIA Regulations. An appropriate programme of archaeological investigation would be undertaken ahead of construction in order to further define and offset the effect.

7.9.29 The decked car park at Pentagon Field would be up to 8 metres high and a new substation here would be up to 5 metres high. The car park may be visible in views from or across the two Grade II listed buildings to the north which now form part of the Courtyard Marriot Hotel (Edgeworth House and Wing House; Figure 7.6.2, Sites 133 and 134). The sensitivity or value of these assets is medium. The setting of these designated heritage assets already includes modern buildings (such as the main hotel building) as well as large areas of surface car parking. The impact of the construction and operation of the decked car park on the significance of these two listed buildings would be no change and the consequent significance of effect would be **no change**, which is not significant in terms of the EIA Regulations.

7.9.30 There are also two Grade II listed buildings located 350 – 400 metres to the north east of Pentagon Field; Old Cottage and Lilac Cottage, both on Donkey Lane (Figure 7.6.2, Sites 140 and 325). These assets are of medium sensitivity or value. Views from and across these two cottages towards Pentagon Field include considerable amounts of mature vegetation immediately to the west of both dwellings, resulting in a total lack of any intervisibility. The impact of the construction and operation of the decked car park on the significance of these two listed buildings would be no change and the consequent significance of effect would be **no change**, which is not significant in terms of the EIA Regulations.

7.9.31 The construction and use of the decked car park at Pentagon Field would result in a change to the character of the historic landscape in this area. This is recorded in the Sussex Historic Landscape Characterisation (HLC) as Character Type 'Assarts' (see Figure 4.1.4 in Appendix 7.6.1: Historic Environment Baseline Report). This Type is relatively common in Sussex, but less common in the vicinity of Gatwick due to the amount of development in the area (including the airport). The decked car park would occupy all of a surviving block of this Type (the HLC records that this extends further to the north, but some has already been replaced by a surface car park). The historic landscape character is considered to be of low sensitivity or value, and the construction and use of the decked car park would represent a high magnitude of impact as the character would be completely lost. The consequent significance of effect has been assessed as **minor adverse**, which is not significant in EIA terms.

Car Park Y

7.9.32 A water runoff treatment and storage facility would be established on land currently used as a surface car park (car park Y) which is adjacent to the Gatwick Premier Inn and which has been present for more than 20 years. Previous disturbance associated with the construction of the hardstanding for car park Y is likely to have removed any buried archaeological remains that may have been present here and this is regarded as an area of low archaeological potential (Figure 7.6.5). It is therefore unlikely that the establishment of this storage facility would impact on buried archaeological remains, nor would it affect the significance of any heritage asset as a result of change within its setting. The magnitude of impact and significance of effect would therefore be **no change**.

Works on the Northern Runway, Taxiways, Aircraft Stands, Virgin Hangar Pavement Works, Relocation of Rendezvous Point North, Pumping Station 2a

7.9.33 All of these works are within the operational airport and in areas that are likely to have been disturbed as a result of previous airfield-related works such as the installation of buried services. As a consequence, any archaeological remains that may have been present here are likely to have been heavily impacted and would now be in a highly degraded state. All of this land is within an identified zone of low archaeological potential (Figure 7.6.5). The magnitude of impact of these works on buried archaeological remains would be negligible and the area is of negligible sensitivity or value. The consequent significance of effect would be **negligible**, which is not significant in terms of the EIA Regulations.

7.9.34 These works would not affect the significance of any heritage asset as a result of change within its setting. The magnitude of impact and significance of effect would therefore be **no change**.

Relocation of Fire Training Ground

7.9.35 The fire training ground is within the western end of the operational airport. It would need to be relocated very slightly to the north and reorganised, but would still remain within land that has been previously disturbed as a result of the establishment of the present fire training ground. As a consequence, any archaeological remains that may have been present here are likely to have been heavily impacted and would now be in a highly degraded state. All of this land is within an identified zone of low archaeological potential (Figure 7.6.5). The magnitude of impact of the relocation of the fire training ground on buried archaeological remains would be negligible and the area is of negligible sensitivity or value. The consequent significance of effect would be **negligible**, which is not significant in terms of the EIA Regulations.

7.9.36 The relocation of the fire training ground would not affect the significance of any heritage asset as a result of change within its setting. This is due to the nature of the works and the distance from any assets. The magnitude of impact and significance of effect would therefore be **no change**.

Demolition

7.9.37 A limited programme of demolition is required as part of the Project; buildings proposed for demolition are identified in Chapter 5: Project Description (paragraph 5.3.75). The only one of these which is considered to have any level of heritage value is the former air traffic control tower located at the northern end of Control Tower Road within the operational airport. This was built as part of the 1956-58 expansion of Gatwick Airport and was in use until a replacement tower was opened in 1984.

7.9.38 The former air traffic control tower is not a designated heritage asset, or a locally listed building. However, it is of some interest and a low sensitivity or value should be applied. The demolition would result in a high magnitude of impact (permanent) and the consequent significance of effect has been assessed as **minor adverse**, which is not significant in EIA terms. This effect would be offset through a programme of building recording to an appropriate level which would be undertaken ahead of demolition.

Environmental Mitigation Land

7.9.39 Several parcels of land have been identified within the Project site boundary where environmental mitigation is proposed. These include parcels of land surrounding Museum Field where planting of trees and hedgerows would be undertaken. The design of any environmental mitigation will take account of the potential presence of buried archaeological remains. Much of the land surrounding Museum Field has already been subject to geophysical survey in connection with the Project (see Figure 6.3.10 in Appendix 7.6.1: Historic Environment Baseline Report).

7.9.40 This land falls within zones of medium or high archaeological potential (Figure 7.6.5) and any archaeological remains here would be of up to medium sensitivity or value (based on current understanding). The impact of the proposed environmental mitigation would be of up to high magnitude and the consequent significance of effect would be up to **major adverse**, which is significant in terms of the EIA Regulations.

7.9.41 However, the programme of further archaeological investigation that would be undertaken ahead of the production of the ES (see Section 7.8 above) would include examination of this land. If archaeological remains of medium (or high) sensitivity or value are identified, appropriate mitigation (see paragraph 7.8.3) may be incorporated into the design of the environmental

mitigation, such that the magnitude of impact should be reduced to negligible. The consequent significance of effect would be up to **minor adverse** (high sensitivity remains), which is not significant in terms of the EIA Regulations. If the appropriate mitigation is not possible, a programme of further archaeological investigation would be undertaken in order to offset the adverse effect.

7.9.42 Other potential areas where environmental mitigation may be undertaken with regard to the Project have been identified within the design process (see Figure 5.2.1g in Chapter 5: Project Description). However, the likelihood and nature of any environmental mitigation at any of these locations remains unknown at the current time. If any environmental mitigation works at any of these locations is identified as having the potential to impact on buried archaeological remains, a suitable programme of archaeological investigation would be designed and implemented in order to mitigate or offset any adverse effects. Likely effects on the significance of heritage assets (as a result of change within their settings) and/or on the character of the historic landscape, would also be assessed and mitigated wherever possible.

Multi Storey Car Park J

7.9.43 This element of the Project would be up to 27 metres high, however it would be consistent with the current massing of the airport infrastructure. The construction and operation of the multi-storey car park J would not affect the significance of any heritage asset as a result of change within its setting. The location is almost wholly within previously developed land and there would be no impact on buried archaeological remains. The magnitude of impact and significance of effect would therefore be **no change**.

South Terminal IDL Extension and Forecourt

7.9.44 This element of the Project would be up to 29 metres high, however it would be consistent with the current massing of the airport infrastructure. The construction and operation of the South Terminal IDL extension and changes to the forecourt would not affect the significance of any heritage asset as a result of change within its setting. The location is almost wholly within previously developed land and there would be no impact on buried archaeological remains. The magnitude of impact and significance of effect would therefore be **no change**.

New hotel at the Building Compound Adjacent to the Car Rental Aite

7.9.45 This element of the Project would be up to 16.3 metres high, however it would be consistent with the current massing of the airport infrastructure. The construction and operation of the new hotel at the building compound adjacent to the car rental site would not affect the significance of any heritage asset as a result of change within its setting. The location is almost wholly within previously developed land and there would be no impact on buried archaeological remains. The magnitude of impact and significance of effect would therefore be **no change**.

Satellite Airport Fire Service Facility

7.9.46 This element of the Project would be up to 15 metres high. The construction and operation of the Satellite Airport Fire Service Facility would not affect the significance of any heritage asset as a result of change within its setting. The location is likely to be within previously developed land and there would be no impact on buried archaeological remains. The magnitude of impact and significance of effect would therefore be **no change**.

Airfield Surface Transport and Grounds Maintenance Facility

7.9.47 This element of the Project would be up to 15 metres high. The construction and operation of the Airfield Surface Transport and Grounds Maintenance Facility would not affect the significance of any heritage asset as a result of change within its setting. The location is wholly within previously developed land and there would be no impact on buried archaeological remains. The magnitude of impact and significance of effect would therefore be **no change**.

Decked Car Park North Terminal Long Stay Phase 1

7.9.48 Phase 1 of the decked car park at North Terminal Long Stay would be up to 11 metres high. The location is within 150 metres of the Grade II* listed Charlwood Park Farmhouse (Figure 7.6.2, Site 27), now operating as a nursery school (Bear and Bunny). The building is of high sensitivity or value. The current setting of the former farmhouse makes a limited contribution to its significance, with detracting elements including the surface car park area to the north as well as the noise and visual impacts from the operational airport.

7.9.49 No part of Phase 1 of the decked car park would be visible in views from and across Charlwood Park Farmhouse, therefore the magnitude of impact would be no change. The significance of effect on the significance of this Grade II* listed building would be **no change**, which is not significant in terms of the EIA Regulations.

7.9.50 The location is almost wholly within previously developed land and there would be no impact on buried archaeological remains. The magnitude of impact and significance of effect on buried archaeology would therefore be **no change**.

North Terminal IDL Extension and Forecourt, and Baggage Reclaim Facility Extension

7.9.51 This element of the Project would be up to 32.5 metres high. The construction and operation of the extension to the North Terminal and changes to the forecourt would not affect the significance of any heritage asset as a result of change within its setting. The location is almost wholly within previously developed land and there would be no impact on buried archaeological remains. The magnitude of impact and significance of effect would therefore be **no change**.

Inter-Terminal Transit System (ITTS) Improvements

7.9.52 The construction and operation of the improvements to the ITTS would not affect the significance of any heritage asset as a result of change within its setting. The location is almost wholly within previously developed land and there would be no impact on buried archaeological remains. The magnitude of impact and significance of effect would therefore be **no change**.

Replacement ‘Purple Parking’ at Crawter’s Field

7.9.53 The construction and operation of this surface car park at the western end of Crawter’s Field would not affect the significance of any heritage asset as a result of change within its setting. The land here has medium potential for buried archaeological remains to be present (Figure 7.6.5) and further investigation of this area is required in order to understand the date, nature, extent and significance of any archaeological remains that may be present. Some of the land required for this car park is currently occupied by woodland which was planted here as part of the post-war expansion of the airport, and this planting and subsequent tree growth would probably have had a detrimental effect on any potential archaeological remains in this location. Consequently, any surviving remains are likely to be of low sensitivity or value. The work required to establish the

surface car park would result in a high magnitude of impact and would be permanent. The consequent significance of effect would be up to **moderate adverse**, which is significant in terms of the EIA Regulations. An appropriate programme of archaeological investigation would be undertaken ahead of construction in order to offset the effect.

Relocation of Pond A and River Mole Diversion

7.9.54 The area required for the relocation of Pond A and the River Mole diversion corresponds to a considerable extent with the land proposed for the airfield satellite compound. This land has been previously subject to archaeological investigation (as part of the Gatwick North West Zone), which established an absence of buried archaeological remains, and the eastern half of this area has recently been used as a contractor compound during construction of the Boeing hangar. However, there is an identified higher level of potential for the presence of palaeochannels associated with the former alignment of the River Mole, as these could be at a level lower than that which was investigated by the previous archaeological work here. If palaeochannels are present, they would be of up to medium sensitivity or value. The impact of relocating Pond A and constructing the River Mole diversion (including the secondary channel) would result in an impact magnitude of up to medium, and the consequent significance of effect would be **moderate adverse**. This is significant in terms of the EIA Regulations. An appropriate programme of investigation would be undertaken in order to offset any adverse effect.

7.9.55 The relocation of Pond A and the construction and use of the River Mole Diversion (including the secondary channel) would not affect the significance of any heritage asset as a result of change within its setting. The magnitude of impact and significance of effect would therefore be **no change**.

Extension to Dog Kennel Pond

7.9.56 The extension to Dog Kennel Pond is located entirely within the current secondary basin established for this pond. Consequently, there is no potential for impact on any buried archaeological remains. The construction and use of the extension to Dog Kennel would not affect the significance of any heritage asset as a result of change within its setting. The magnitude of impact and significance of effect would therefore be **no change**.

Construction Noise

7.9.57 Chapter 14: Noise and Vibration addresses the issue of construction noise. Initial modelling has been undertaken and the results are presented in Appendix 14.9.1. However, it is important to note that this assessment is worst case, based on a series of cautious assumptions, in order to provide an indication of the potential scale of adverse effects at this stage. The construction noise modelling and assessment will be refined in the ES, including further consideration of mitigation measures and impacts on specific sensitive receptors including heritage assets. This will allow the ES to consider the overall impacts and effects on individual heritage assets.

Ground Noise

7.9.58 No ground noise would be generated by the Project until the first full year of opening (2029).

Road Traffic Noise

7.9.59 Chapter 14: Noise and Vibration addresses the issue of road traffic noise. Modelling of construction traffic noise during peak airfield and peak highways work will be undertaken and this

information will be available for the ES. This will facilitate assessment of potential impacts and effects on individual heritage assets where appropriate.

Further Mitigation

7.9.60 No further mitigation is proposed. Some archaeological investigation may be undertaken of land within Museum Field and east of Museum Field, also the surrounding land required for environmental mitigation, South Terminal surface access contractor compound, Pentagon Field and the replacement 'Purple Parking' area at the west of Crawter's Field. Some geoarchaeological investigation will be undertaken within the car park X flood compensation area and also ahead of the River Mole diversion and the relocation of Pond A, and possibly ahead of the establishment of the airfield satellite contractor compound. The former air traffic control tower would be subject to a programme of historic building recording prior to demolition. In all cases this would be part of the process of 'offsetting' harm rather than avoiding or reducing impacts.

Future Monitoring

7.9.61 No future monitoring is proposed with regard to any effects on the historic environment during construction.

2030-2032 Ongoing construction works and first years of operation of the Northern Runway

Central Area Recycling Enclosure (CARE) Facility

7.9.62 The existing CARE facility would need to be replaced as part of the Project. The relocated CARE facility would process all airport waste and would include buildings up to 22 metres high and a flue up to 50 metres high. Two potential locations have been identified for the relocated CARE facility (see Chapter 5: Project Description). Both are located in areas of land within the operational airport that are used as surface car parks, and some of the land at the western potential location (Option 2) has been previously subject to archaeological investigation in 2002. The archaeological potential for both locations is considered to be low as a result of previous development.

7.9.63 The construction and operation of CARE Option 1 would not affect the significance of any heritage asset as a result of change within its setting.

7.9.64 The CARE Option 2 site is located further to the west than Option 1 and is closer to the boundary of the operational airport. The location is within 200 metres of the Grade II* listed Charlwood Park Farmhouse (Figure 7.6.2, Site 27), now operating as a nursery school (the Bear and Bunny nursery). The current setting of the former farmhouse makes a limited contribution to its significance, with detracting elements including the surface car park area to the north as well as the noise impacts from the operational airport.

7.9.65 The proposed flue of the relocated CARE facility on the Option 2 site is likely to be visible in views from and across the Grade II* listed building. This is a resource of high sensitivity or value and the magnitude of impact would be low and permanent (but reversible), with the consequent significance of effect assessed as **minor adverse**. This is not significant in terms of the EIA Regulations.

7.9.66 The proposed flue of the relocated CARE facility on the Option 1 and Option 2 sites could be visible in views from and across other designated heritage assets, including the listed buildings and Conservation Area at Charlwood (see Figure 7.6.2). These assets are considered to be of medium to high sensitivity or value. However, the distance between these assets and the CARE facility would mean that the magnitude of any impacts would be negligible at worst and the consequent significance of effect in all cases would be **minor adverse**, which is not significant in terms of the EIA Regulations.

Replacement Motor Transport Facility

7.9.67 This element of the Project would be up to 15 metres high. The construction and operation of the Replacement Motor Transport Facility would not affect the significance of any heritage asset as a result of change within its setting. The location is wholly within previously developed land and there would be no impact on buried archaeological remains. The magnitude of impact and significance of effect would therefore be **no change**.

North Terminal Baggage Hall Extension

7.9.68 This element of the Project would be up to 12.5 metres high. The construction and operation of the North Terminal baggage hall extension would not affect the significance of any heritage asset as a result of change within its setting. The location is almost wholly within previously developed land and there would be no impact on buried archaeological remains. The magnitude of impact and significance of effect would therefore be **no change**.

Decked Car Park North Terminal Long Stay Phase 2

7.9.69 Phase 2 of the decked car park at North Terminal Long Stay would be up to 27 metres high. The location is within 150 metres of the Grade II* listed Charlwood Park Farmhouse (Figure 7.6.2, Site 27), now operating as a nursery school (Bear and Bunny). The building is of high sensitivity or value. The current setting of the former farmhouse makes a limited contribution to its significance, with detracting elements including the surface car park area to the north as well as the noise and visual impacts from the operational airport.

7.9.70 No part of Phase 2 of the decked car park would be visible in views from and across Charlwood Park Farmhouse, therefore the magnitude of impact would be no change. The significance of effect on the significance of this Grade II* listed building would be **no change**, which is not significant in terms of the EIA Regulations.

7.9.71 The location is almost wholly within previously developed land and there would be no impact on buried archaeological remains. The magnitude of impact and significance of effect on buried archaeology would therefore be **no change**.

North Terminal Hotel at Car Park Y

7.9.72 This element of the Project would be up to 27 metres high. The operation of the North Terminal Hotel at car park Y would not affect the significance of any heritage asset as a result of change within its setting. The construction of the hotel would not impact on buried archaeological remains. Previous disturbance associated with the construction of the car park Y underground water treatment and runoff storage facility is likely to have removed any buried archaeological remains that may have been present here and this is regarded as an area of low archaeological

potential (Figure 7.6.5). The magnitude of impact and significance of effect would therefore be **no change**.

South Terminal Hotel at Car Park H/ Multi-storey Car Park H Phase 2 / New Office Buildings

7.9.73 These elements of the Project would be up to 27 metres high. They may be visible in views from or across the two Grade II listed buildings to the east which now form part of the Courtyard Marriot Hotel (Edgeworth House and Wing House; Figure 7.6.2, Sites 133 and 134), although the main part of the existing hotel lies directly between the listed buildings and these elements of the Project. These assets are of medium sensitivity or value. The setting of these designated heritage assets already includes modern buildings (such as the main Courtyard Marriot Hotel building) as well as large areas of surface car parking. The impact of the construction and operation of the hotel, the multi-storey car park and the office buildings on the significance of these two listed buildings would be no change. The consequent significance of effect would be **no change**, which is not significant in terms of the EIA Regulations.

7.9.74 The construction and operation of the South Terminal Hotel, multi-storey car park H and office buildings would not affect the significance of any heritage asset as a result of change within its setting. The location is almost wholly within previously developed land and there would be no impact on buried archaeological remains. The magnitude of impact and significance of effect on buried archaeology would therefore be **no change**.

Pumping Station 7a

7.9.75 This element of the Project would be up to 3 metres high. The construction and operation of Pumping Station 7a would not affect the significance of any heritage asset as a result of change within its setting. The location is wholly within previously developed land and there would be no impact on buried archaeological remains. The magnitude of impact and significance of effect would therefore be **no change**.

Substation North of Pier 7

7.9.76 This element of the Project would be up to 5 metres high. The construction and operation of the substation north of Pier 7 would not affect the significance of any heritage asset as a result of change within its setting. The location is wholly within previously developed land and there would be no impact on buried archaeological remains. The magnitude of impact and significance of effect would therefore be **no change**.

Surface Access: South Terminal Roundabout Improvements

7.9.77 The principal element of these improvements comprises the construction of a flyover to carry the M23 Spur/A23 Airport Way over the existing roundabout. This structure would be approximately 130 metres long and up to 8 metres above existing ground level. The M23 Spur would be raised by around 2.2 m as it passes over the B2036 Balcombe Road and this overbridge would need to be replaced or strengthened. The road would also be widened to accommodate new slip roads providing access to and from a new roundabout arm linking into the land to the north. A noise barrier up to 1 metre high would be constructed along the elevated section of highway.

7.9.78 The construction and operation of the South Terminal Roundabout Improvements would not affect the significance of any heritage asset as a result of change within its setting. The location of the improvements is almost wholly within previously developed land and there would be no

impact on buried archaeological remains. Some land required for the improvements to the north of the South Terminal Roundabout and the M23 Spur/A27 Airport Way has not been previously developed, but any buried archaeological remains which may be present would have been addressed during the establishment of the satellite contractor compound at this location. The magnitude of impact and significance of effect would therefore be **no change**.

Surface Access: North Terminal Roundabout Improvements

7.9.79 The principal element of these improvements comprises the construction of a flyover to carry the A23 Airport Way over the existing roundabout. This structure would be approximately 200 metres long and up to 8 metres above existing ground level. A noise barrier up to 1 metre high would be constructed along the elevated central section of highway, whilst a second noise barrier up to 2 metres high would be constructed along a section adjacent to Riverside Park.

7.9.80 The construction and operation of the North Terminal Roundabout Improvements would not affect the significance of any heritage asset as a result of change within its setting. The location of the improvements is wholly within previously developed land and there would be no impact on buried archaeological remains. The magnitude of impact and significance of effect would therefore be **no change**.

7.9.81 However, it is possible that some environmental mitigation may be undertaken within a small triangle of land to the west of the railway and north of the A27 Airport Way. This land is currently used as a staff car park (part of Car Park B) and also contains an electricity substation. It is also a designated Area of High Archaeological Potential (Site 498) relating to the antiquarian discovery of prehistoric flintwork, Late Iron Age cremation burials, and Roman pottery and coins. It is not known if any archaeological remains are present here given the extent of development work in the later part of the 20th century, but the potential for such remains to be present cannot be ruled out. If present, archaeological remains are likely to be of up to high sensitivity or value. Depending on the nature of the works required here, the magnitude of impact could be up to high and could be permanent. In this event, the consequent significance of effect could be up to **major adverse**, which is significant in terms of the EIA Regulations, however, see text below (paragraph 7.9.109) regarding potential further mitigation here that would reduce this significance of effect.

Surface Access Satellite Contractor Compound, Longbridge Roundabout

7.9.82 The land proposed for this contractor compound is located to the north of the Longbridge roundabout at the junction of the A23 and A217 roads. This land has not been previously developed.

7.9.83 No archaeological field survey has yet been undertaken with regard to this proposed compound location. An Area of High Archaeological Potential is located immediately to the north; this has been established on the basis of a small moated site with associated fish ponds (Figure 7.6.1, Sites 491, 492 and 554). The proposed compound area is also located partially within the Church Lane (Horley) Conservation Area designated by Reigate and Banstead Borough Council (Figure 7.6.2).

7.9.84 The programme of further archaeological investigation that would be undertaken ahead of the production of the ES (see Section 7.8 above) is likely to include examination of this location. If present, archaeological remains are likely to be of up to high sensitivity or value. Depending on

the nature of the works required for establishment of the contractor compound, the magnitude of impact could be up to high and could be permanent. In this event, the consequent significance of effect could be up to **major adverse**, which is significant in terms of the EIA Regulations, however, see text below (paragraph 7.9.109) regarding potential further mitigation here that would reduce this significance of effect.

7.9.85 The establishment and use of the contractor compound to the north of the Longbridge roundabout would represent a change within the setting of the Church Lane (Horley) Conservation Area in respect of that part of the compound which is outside the Conservation Area. This western part of the Conservation Area includes land either side of the River Mole that is predominantly open, and indeed the western boundary of the Conservation Area is not actually represented on the ground by any physical feature. This openness is a key element in this part of the Conservation area and extends to its setting, which makes a strong contribution to its significance. However, the establishment and use of the contractor compound would not affect the eastern part of the Conservation Area which contains the historic settlement core including several of listed buildings. The Conservation Area is of medium sensitivity or value and the establishment and use of the contractor compound would represent a low magnitude of impact that would be fully reversible. The consequent significance of effect would be **minor adverse**, which is not significant in EIA terms.

7.9.86 The establishment and use of the contractor compound to the north of the Longbridge roundabout would not affect the significance of any other heritage asset as a result of change within its setting. This is due to the nature of the works and the distance from the assets, also the presence of belts of mature trees between the proposed compound location and the listed buildings in the eastern part of the Conservation Area. The magnitude of impact and significance of effect would therefore be **no change**.

7.9.87 The establishment and use of the contractor compound to the north of the Longbridge roundabout would result in a change to the character of the historic landscape in this area. This is recorded in the Surrey Historic Landscape Characterisation (HLC) as Character Subtype 'Large regular fields with straight boundaries (parliamentary enclosure type' (see Figure 4.1.5 in Appendix 7.6.1: Historic Environment Baseline Report). This Subtype is relatively common in Surrey, but less common in the vicinity of Gatwick due to the amount of development in the area (including the airport). The contractor compound would occupy a small part of a larger block of this Subtype which extends to the north and north west. The historic landscape character is considered to be of low sensitivity or value, and the establishment and use of the contractor compound would represent a low magnitude of impact. The consequent significance of effect has been assessed as **negligible**, which is not significant in EIA terms.

Longbridge Roundabout Improvements

7.9.88 The works here involve the establishment of a slightly larger diameter roundabout to allow full width running lanes through the junction. There would also be additional pedestrian crossing facilities and improved capacity on exit and entry lanes, along with any necessary highway drainage works to accommodate surface water run-off.

7.9.89 The construction and operation of the Longbridge Roundabout Improvements would not affect the significance of any heritage asset as a result of change within its setting. The location of the improvements is within existing highway land and there would be no impact on buried

archaeological remains. The magnitude of impact and significance of effect would therefore be **no change**.

Air Noise

7.9.90 As described above (paragraph 7.6.38), there are three noise-sensitive designated heritage assets within the predicted negative noise change footprint and two noise-sensitive designated heritage assets within the predicted positive noise change footprint.

7.9.91 Chapter 14: Noise and Vibration addresses the issue of air noise and Table 5.3.1 in Appendix 14.9.2 presents noise information with regard to noise-sensitive buildings. For the Church of St John the Baptist at Capel (Site 872, NHLE 1378150) the $L_{eq\ 16\ hr}$ day noise level (in 2019) is 53.4dB. The predicted $L_{eq\ 16\ hr}$ day noise level in 2032 without the Project (ie the Do Nothing scenario) is 51.4dB, indicating a reduction in air noise due to changes in aircraft fleet mix. The predicted $L_{eq\ 16\ hr}$ day noise level in 2032 with the Project is 52.7dB, representing a decrease of 0.7dB when measured against the current situation and an increase of 1.3dB when measured against the 2032 baseline without the Project. This predicted increase of 1.3dB in the $L_{eq\ 16\ hr}$ day noise level would not affect the significance of the Grade II listed Church of St John the Baptist at Capel, particularly given that it actually represents a reduction in air noise compared to the present situation.

7.9.92 Specific results have not been reported with regard to the Grade II listed Quaker Meeting House with attached cottage at Capel (Site 873, NHLE 1028737), however it lies within the 51-54dB $L_{eq\ 16\ hr}$ contour range and it is assumed that noise levels (current and predicted) will be very similar to those for the nearby Church of St John the Baptist 300 metres to the north. Consequently, the changes in air noise would not affect the significance of the Grade II listed Quaker Meeting House with attached cottage at Capel.

7.9.93 For the relocated Grade II listed Lowfield Heath Windmill south west of Charlwood (Site 332, NHLE 1298883), Table 5.3.1 in Appendix 14.9.2 shows that the $L_{eq\ 16\ hr}$ day noise level (in 2019) is 57.9dB. The predicted $L_{eq\ 16\ hr}$ day noise level in 2032 without the Project (ie the Do Nothing scenario) is 55.7dB, indicating the reduction in air noise due to changes in aircraft fleet mix. The predicted $L_{eq\ 16\ hr}$ day noise level in 2032 with the Project is 57.7dB, representing a decrease of 0.2dB when measured against the current situation and an increase of 2.0dB when measured against the 2032 baseline without the Project. This predicted increase of 2.0dB in the $L_{eq\ 16\ hr}$ day noise level in 2032, over the otherwise baseline noise levels that would have been present in 2032, would be rated as 'low' and not a significant change in terms of the likely effects on people (as explained in Section 14.4 of chapter 14: Noise and Vibration) and would not affect the significance of the Grade II listed Lowfield Heath Windmill. Contextually, the air noise would be less than compared to the present situation.

7.9.94 For the Grade II* listed Church of St Michael and All Angels at Lowfield Heath (Site 24, NHLE 1187081), Table 5.3.1 in Appendix 14.9.2 shows that the $L_{eq\ 16\ hr}$ day noise level (in 2019) is 65.6dB. The predicted $L_{eq\ 16\ hr}$ day noise level in 2032 without the Project (ie the Do Nothing scenario) is 63.7dB, indicating the reduction in air noise due to changes in aircraft fleet mix. The predicted $L_{eq\ 16\ hr}$ day noise level in 2032 with the Project is 62.5dB, representing a decrease of 3.1dB when measured against the current situation and a decrease of 1.2dB when measured against the 2032 baseline without the Project. This predicted decrease of 3.1dB in the $L_{eq\ 16\ hr\ day}$ noise level compared to the current situation is welcomed but would not affect the significance of

effect on the Grade II listed Church of St John the Baptist at Capel, as the noise environment here is dominated by traffic noise and also noise from the surrounding industrial units.

7.9.95 No measurements have been produced with regard to the Grade II listed Lowfield Heath War Memorial (Site 389, NHLE 1452793), but it is assumed that noise levels (current and predicted) will be very similar to those for the adjacent Church of St Michael and All Angels. Consequently, the changes in air noise would not affect the significance of the Grade II listed Lowfield Heath War Memorial.

Construction Noise

7.9.96 Chapter 14: Noise and Vibration addresses the issue of construction noise. Initial modelling has been undertaken and the results are presented in Appendix 14.9.1. However, it is important to note that this assessment is worst case, based on a series of cautious assumptions, in order to provide an indication of the potential scale of adverse effects at this stage. The construction noise modelling and assessment will be refined in the ES as more details of the construction works, programme and mitigation become available. The current modelling has not been done at a scale that allows consideration of impacts and effects on individual heritage assets.

Ground Noise

7.9.97 Predicted changes in ground noise resulting from the operation of the Project are presented in Chapter 14: Noise and Vibration. Ground noise includes taxiing aircraft but not reverse thrust as this is part of the air noise assessment. Noise monitoring has been undertaken at twelve selected locations in the vicinity of the airport which are considered to be the nearest noise sensitive receptors - these are referred to as the baseline noise monitoring sites and their locations are indicated on Figure 14.4.1.

7.9.98 Baseline noise monitoring Location 4 is the Grade II* listed Charlwood Park Farmhouse (the current Bear and Bunny Nursery – Site 27), whilst baseline noise monitoring Location 11 is the Grade II* listed Rowley Farmhouse (Site 22). Baseline noise monitoring Locations 1 and 2 are close to the edge of the Charlwood Conservation Area (Site 397) and the listed buildings at Charlwood, whilst baseline noise monitoring Location 10 is close to the Grade II* listed Charlwood House (Site 23) and several Grade II listed buildings.

7.9.99 Table 14.9.5 presents the predicted 2032 ground noise levels (with designed-in mitigation) versus the predicted 2032 ground noise levels without the Project (the Do-Nothing scenario) at the twelve selected locations. The table shows the changes separately for night (23.00 – 07.00) and daytime (07.00 – 23.00) and for two modes of runway operation - 26 and 08. These modes relate to the directional use of the runways (a description of this is provided in Chapter 4: Existing Site and Operation). The noise levels are expressed in dB as $L_{Aeq,\,T}$ dB, which is a single figure used to describe a sound that varies over a given time period.

7.9.100 It should be noted that in the assessment provided below with regard to specific properties and areas, the magnitude of impact and significance of effect may differ from the assessment presented within Chapter 14: Noise and Vibration, as these two assessments are not looking at the same receptors. The receptor in this chapter in each case is the historic building or area, whilst in Chapter 14: Noise and Vibration the receptors are the people within the building or area.

7.9.101 The predicted increase in daytime ground noise $L_{Aeq,\,T}$ dB (2032 Project with mitigation versus 2032 baseline) at the Grade II* listed Charlwood Park Farmhouse is 2-4dB, whilst at the Grade II*

listed Rowley Farmhouse and also in the vicinity of the Grade II* listed Charlwood House and the nearby Grade II listed buildings the predicted increase is 0-1dB. The magnitude of impact on each of these heritage assets has been assessed as no change, with the consequent significance of effect in each case being **no change**.

7.9.102 The predicted increase in daytime ground noise $L_{Aeq, T}$ dB (2032 Project with mitigation versus 2032 baseline) at baseline noise monitoring Locations 1 and 2 is 2-5dB, and these locations are considered to be representative of the Charlwood Conservation Area. There are three heritage assets of high sensitivity or value at Charlwood, comprising the Grade I listed Church of St Nicholas (Site 14), along with The Manor House (Site 33) and the Providence Chapel (Site 36), both of which are listed at Grade II*. Both the listed Church of St Nicholas (Site 14) and the Providence Chapel (Site 36) are classed as noise-sensitive heritage assets using the criteria established for the assessment of impacts arising from air noise change (Temple Group and Cotswold Archaeology, 2014). The magnitude of impact on each of the three heritage assets of high sensitivity or value at Charlwood has been assessed as negligible and long-term. The consequent significance of effect in respect of these three heritage assets would be **minor adverse**, which is not significant in terms of the EIA regulations.

7.9.103 The Charlwood Conservation Area is a heritage asset of medium sensitivity or value, as are the 33 Grade II listed buildings within and adjacent to the Conservation Area (and within the defined study area – see Figure 7.6.2). As described above, the magnitude of impact on each of these heritage assets has been assessed as negligible and long-term, with the consequent significance of effect in each case being assessed as **negligible adverse**. This is not significant in terms of the EIA Regulations.

Road Traffic Noise

7.9.104 The results of the road traffic noise modelling for 2032 are presented in Chapter 14: Noise and Vibration. This modelling has focused on the changes around the North and South Terminal Roundabouts, but also reports changes on the wider network.

7.9.105 The results of the modelling of 2032 traffic noise are shown on Figure 14.9.33, which shows the predicted traffic noise with the Project (and the designed-in noise mitigation) versus the predicted 2032 baseline without the Project (ie the Do-Nothing scenario).

7.9.106 The Grade I listed Church of St Bartholomew located on Church Road, Horley (Figure 7.6.2, Site 16) would experience a reduction in road traffic noise of between 0-1dB, and this applies to the other listed buildings in the vicinity of the church. A small part of the western side of Church Road (Horley) Conservation Area at Horley (Figure 7.6.1, Site 16) would experience an increase in road traffic noise of 0-1dB, whilst the greater part of this conservation area would experience a reduction in road traffic noise of between 0-1dB. The nearby Massetts Road Conservation Area (Figure 7.6.2, Site 398) would similarly experience a reduction in road traffic noise of 0-1dB.

7.9.107 The Grade II listed Edgeworth House and Wing House in the eastern side of the airport and now part of the Courtyard by Marriot hotel (Figure 7.6.2, Sites 133 and 134) would experience an increase in road traffic noise of 0-1dB. Several other Grade II listed buildings located to the north-east of the airport would also experience an increase in road traffic noise of 0-1dB, including The Orchard Cottage (Site 80), Fishers Cottage and The Barn (Site 320), Inholms Farm House (Site 75) and Yew Tree Cottage (Site 76).

7.9.108 These predicted changes in road traffic noise are all rated as negligible in the assessment of noise effects in the area as reported in Chapter 14 and would not result in any harmful effect on the significance of any heritage asset. The magnitude of impact and significance of effect would therefore be **no change**.

Further Mitigation

7.9.109 It may be possible for appropriate mitigation (see paragraph 7.8.3) to be incorporated into the methodology for the establishment of the construction compound north of Longbridge Roundabout, and the land at Car Park B if this area is required for environmental mitigation, such that the magnitude of impact would be reduced to negligible.

Significance of Effect

7.9.110 The consequent significance of effect in respect of the establishment of the construction compound north of Longbridge Roundabout could be up to **minor adverse** (high sensitivity remains) or **negligible** (medium sensitivity remains), which are not significant in terms of the EIA Regulations. If the appropriate mitigation is not possible, a programme of further archaeological investigation would be undertaken in order to further define and offset the adverse effect.

Future Monitoring

7.9.111 No future monitoring is proposed with regard to any effects on the historic environment during this phase of the Project.

2033-2038

New Hangar

7.9.112 This element of the Project would be up to 32 metres high. The construction and operation of the new hangar would not affect the significance of any heritage asset as a result of change within its setting. The location is almost wholly within previously developed land which has been subject to previous archaeological investigation; there would be no impact on buried archaeological remains. The magnitude of impact and significance of effect would therefore be **no change**.

Pier 7

7.9.113 This element of the Project would be up to 18 metres high. The construction and operation of the new Pier 7 would not affect the significance of any heritage asset as a result of change within its setting. The location is almost wholly within previously developed land which has been subject to previous archaeological investigation; there would be no impact on buried archaeological remains. The magnitude of impact and significance of effect would therefore be **no change**.

Multi-storey Car Park Y

7.9.114 This element of the Project would be up to 27 metres high. The construction and operation of multi-storey car park Y would not affect the significance of any heritage asset as a result of change within its setting. Previous disturbance associated with the construction of the car park Y underground water treatment and runoff storage facility is likely to have removed any buried archaeological remains that may have been present here and this is regarded as an area of low archaeological potential (Figure 7.6.5). The magnitude of impact and significance of effect would therefore be **no change**.

Autonomous Vehicle Stations at North and South Terminals

7.9.115 These elements of the Project would be two storeys in height. The construction and operation of the new hangar would not affect the significance of any heritage asset as a result of change within its setting. The locations are wholly within previously developed land which has been subject to previous archaeological investigation; there would be no impact on buried archaeological remains. The magnitude of impact and significance of effect would therefore be **no change**.

Flood Compensation Area – Gatwick Stream

7.9.116 A flood compensation area is proposed in the south eastern part of the Project site, south of the Crawley Sewage Treatment Works and east of the Gatwick Stream. Geophysical survey carried out within part of the area with regard to the Project identified considerable previous disturbance, including that associated with the construction of the Flood Storage (Control) Reservoir a few years ago.

7.9.117 The works would involve lowering existing ground levels up to approximately 5 metres. Some of this land was archaeologically investigated ahead of the construction of the Flood Storage (Control) Reservoir, along with much of the land immediately to the west. Material of Upper Palaeolithic, Mesolithic, Iron Age, Roman and medieval date was recovered, including a number of Iron Age urned and unurned cremation burials with evidence of contemporary settlement. Archaeological activity clearly extended beyond those areas which were examined and into undisturbed land which now falls within the area required for flood storage as part of the Project.

7.9.118 Further investigation of the potential archaeological remains in this area is required in order to understand their date, nature, extent and significance. Based on the result of the previous archaeological work in the vicinity, buried remains within the land required for the Project are likely to be of medium sensitivity or value, however this would be confirmed by the proposed investigation. Ground reduction to create a flood storage reservoir would result in a high magnitude of impact and would be permanent. The consequent significance of effect would be up to **major adverse**, which is significant in terms of the EIA Regulations. Additional archaeological investigation would be undertaken as appropriate, but this would be part of the process of 'offsetting' harm rather than avoiding or reducing impacts.

7.9.119 The establishment of the flood compensation area east of Gatwick Stream would result in a change to the character of the historic landscape in this area. This is recorded in the Sussex Historic Landscape Characterisation (HLC) as Character Type 'Informal Fieldscapes' (see Figure 4.1.4 in Appendix 7.6.1: Historic Environment Baseline Report). This Type is relatively common in Sussex, but slightly less common in the vicinity of Gatwick due to the amount of development in the area (including the airport). The flood compensation area would occupy part of a larger block of this Type which extends west. The historic landscape character is considered to be of low sensitivity or value, and the establishment of the flood compensation area would represent a negligible magnitude of impact as the field boundaries would remain intact. The consequent significance of effect has been assessed as **negligible**, which is not significant in EIA terms.

Air Noise

7.9.120 Figure 14.9.30 of this PEIR shows the predicted $L_{eq\ 16\ hr}$ day air noise contour areas for 2038. In all cases, noise contours are very similar to those predicted for 2032 (Figure 14.6.13). Detailed assessment of the 2033-2038 impacts and effects of air noise on heritage assets is not necessary

because the outcomes in all cases would be the same as for the 2032 impacts and effects reported above.

Ground Noise

7.9.121 Appendix 14.9.3 of this PEIR shows the predicted ground noise levels for 2038 with regard to the twelve monitoring locations. These ground noise levels are lower than those predicted for 2032 due to a larger proportion of next generation aircraft in the fleet. Detailed assessment of the 2038 impacts and effects of ground noise on heritage assets is not necessary because the outcomes in all cases would be the same as, or less than, the 2032 impacts and effects reported above.

Road Traffic Noise

7.9.122 Detailed assessment of the 2038 impacts and effects of road traffic noise on heritage assets is not necessary because the outcomes in all cases would be the same as, or less than, the 2032 impacts and effects reported above.

Further Mitigation

7.9.123 No further mitigation is proposed. Some archaeological investigation may be undertaken within the flood compensation area east of Gatwick Stream, but this would be part of the process of 'offsetting' harm rather than avoiding or reducing impacts.

Future Monitoring

7.9.124 No future monitoring is proposed with regard to any effects on the historic environment during this phase of the Project.

Design Year: 2038

Flood Compensation Area –Gatwick Stream

7.9.125 There are two Grade II listed buildings just to the south of this area, fronting onto Radford Road: Brookside (Figure 7.6.2, Site 157) and Radford Farmhouse (Site 192). They are both of medium sensitivity or value. Both of these have well-established mature vegetation to the rear of the properties, and there is no visual connection between the listed buildings and the land proposed for the flood compensation area. The impact of the operation of the flood storage area on the significance of these listed buildings would be no change. The consequent significance of effect would be **no change**, which is not significant in terms of the EIA Regulations.

Air Noise

7.9.126 Figure 14.9.34 of this PEIR shows the predicted Leq 16 hr day air noise contour areas for 2038. In all cases, noise contours are very similar to those predicted for 2032 (Figure 14.6.13). Detailed assessment of the 2033-2038 impacts and effects of air noise on heritage assets is not necessary because the outcomes in all cases would be the same as for the 2032 impacts and effects reported above.

Ground Noise

7.9.127 Appendix 14.9.3 of this PEIR gives predicted levels of ground noise in 2038 which are lower than or similar to those predicted for 2032. Detailed assessment of the 2038 impacts and effects of

ground noise on heritage assets is not necessary because the outcomes in all cases would be the same or less as for the 2032 impacts and effects reported above.

Road Traffic Noise

7.9.128 Road traffic noise impacts in 2038 will be similar to those in 2032 and so a separate assessment of impacts is not required.

Further Mitigation

7.9.129 No further mitigation is proposed.

Future Monitoring

7.9.130 No future monitoring is proposed with regard to any effects on the historic environment during this phase of the Project.

7.10. Potential Changes to the Assessment as a Result of Climate Change

7.10.1 As set out in the Future Baseline section (Section 7.6) there are unlikely to be any significant changes to the historic environment baseline as a result of climate change. Therefore, the assessment of effects set out above is unlikely to be affected by climate change.

7.11. Cumulative Effects

Zone of Influence

7.11.1 The zone of influence (ZoI) for the historic environment has been identified based on the spatial extent of likely effects. The ZoI is the same as the defined study area for the assessment of potential effects on designated heritage assets as a result of change within their setting, ie a zone extending 3 km from the Project site boundary.

Screening of Other Developments and Plans

7.11.2 The Cumulative Effect Assessment (CEA) takes into account the impact associated with the Project together with other developments and plans. The projects and plans selected as relevant to the CEA presented within this chapter are based upon the results of a screening exercise undertaken as part of the 'CEA short list' of developments (see Appendix 19.4.1). Each development on the CEA long list has been considered on a case by case basis for scoping in or out of this chapter's assessment based upon data confidence, effect-receptor pathways and the spatial/temporal scales involved.

7.11.3 In undertaking the CEA for the Project, it is important to bear in mind that the likelihood of other developments and plans being constructed varies depending on how far along the planning process they are. For example, relevant developments and plans that are already under construction are likely to contribute to a cumulative impact with the Project (providing impact or spatial pathways exist), whereas developments and plans not yet approved or not yet submitted are less certain to contribute to such an impact, as some may not achieve approval or may not ultimately be built due to other factors. For this reason, all relevant development and plans considered cumulatively alongside the Project have been allocated into 'Tiers', reflecting their current stage within the planning and development process. Appropriate weight is therefore given to each Tier in the decision-making process when considering the potential cumulative

impact associated with the Project (eg it may be considered that greater weight can be placed on the Tier 1 assessment relative to Tier 2). Further details of the screening process for the inclusion of other developments and plans in the short list and a description of the Tiers are provided in Chapter 19: Cumulative Effects and Inter-relationships.

7.11.4 The specific developments scoped into the CEA for the historic environment and the Tiers into which they have been allocated, are outlined in Table 7.11.1. The developments included as operational in this assessment have been commissioned since the baseline studies for this Project were undertaken and as such were excluded from the baseline assessment. Full details of each of the developments are provided in Appendix 19.4.1 of this PEIR.

Table 7.11.1: List of Other Developments and Plans considered within CEA

Description of Development/Plan	Planning Phase	Distance from the Project	Date of Construction (if applicable)	Overlap with the Project?
Tier 3				
Horley Employment Park: Policy HOR9 of the adopted Reigate & Banstead Development Management Plan 2018-2027	Allocated	0 km	Not yet known	Not yet known

Cumulative Effects Assessment

7.11.5 A description of the significance of cumulative effects upon the historic environment arising from each identified impact is given below. The development identified in Table 7.11.1 would not result in cumulative effects on designated heritage assets as a result of change within their settings. This is the due to the nature of the development and the distance between the development and any designated assets reviewed in relation to the Project.

Initial Construction Phase: 2024-2029

7.11.6 The proposed development of the Horley Employment Park, located on land to the west of Balcombe Road, is set out in Policy HOR9 'Horley Strategic Business Park' of the adopted Reigate and Banstead Development Management Plan 2018-2027. This area coincides with the proposed location of the surface access satellite contractor compound for the South Terminal. Under Policy HOR9 the site is allocated for a strategic business park of predominantly offices; a complementary range of commercial, retail and leisure facilities to serve and facilitate the main business use of the site; and at least five hectares of new high quality public open space, including parkland and outdoor sports facilities. Currently there are no details in terms of the timing of this development.

7.11.7 The Horley Employment Park development will be subject to a number of requirements and considerations including the following.

- The development must have regard to conserving the setting of Listed Buildings at Fishers Farm and the locally listed buildings at Bayhorne Farm and Bayhorne.
- The retention of important hedgerows will be encouraged as will retention of a buffer to the green corridor along Balcombe Road to retain the historic landscape character.

7.11.8 Taking into account the policy requirement above and that Policy NE9: Heritage Assets of the same planning document requires all development sites over 0.4 hectares to undertake an archaeological assessment (including field evaluation where appropriate), it is not anticipated that there would be any significant cumulative effects on buried archaeology.

2030-2032

7.11.9 No further cumulative effects have been identified.

2033-2038

7.11.10 No further cumulative effects have been identified.

Design Year: 2038

7.11.11 No further cumulative effects have been identified.

7.12. Inter-Related Effects

7.12.1 This chapter of the PEIR assesses the effects on historic environment resources including historic buildings and areas, historic landscape character and buried archaeological remains. There is an inter-relationship with other environmental topics including landscape, ecology, traffic, noise (air and ground noise) and water. Whilst this chapter assess effects on historic landscape, effects on landscape character and visual amenity are considered in Chapter 8: Landscape, Townscape and Visual Resources.

7.12.2 This chapter assesses the effects of traffic and noise (ground and air noise) on the significance of heritage assets, however the environmental effects of traffic and noise are considered in Chapter 12: Traffic and Transport and Chapter 14: Noise and Vibration respectively.

7.12.3 This chapter assesses the effects of environmental mitigation on heritage assets and buried archaeological remains, however the design of ecological, landscape and flood risk mitigation is considered in Chapter 8: Landscape, Townscape and Visual Resources, Chapter 9: Ecology and Nature Conservation, and Chapter 11: Water Environment.

7.12.4 Further information on inter-related effects is provided in Chapter 19: Cumulative Effects and Inter-relationships.

7.13. Summary

Initial Construction Phase 2024-2029

7.13.1 During this phase of the Project the majority of contractor compounds would be established. Where the proposed compounds are located on previously developed land (eg the main contractor compound), the significance of effect on buried archaeological remains would be negligible as the archaeological remains are likely to have already been lost or badly damaged by earlier development. In the proposed compound locations that have not been previously developed, there is the potential for palaeochannels or buried archaeological remains to exist. Where possible, a programme of archaeological investigation is planned to confirm the date, nature and extent of any archaeological remains, and the results will be reported in the ES. The impact on buried archaeological remains as a result of the establishment of contractor

compounds on land that has not been previously developed could result in a significance of effect up to **major adverse**.

7.13.2 Appropriate mitigation measures may be incorporated into the establishment of the contractor compounds to avoid or reduce damage to the buried archaeological remains. With these measures in place, the significance of effect would reduce to **negligible** to **minor adverse**. Where it is not possible to apply any mitigation measures, the effects would be offset through a programme of further archaeological investigation.

7.13.3 The works required to establish contractor compounds would not significantly affect any deposits of geoarchaeological interest as such deposits would be located at a greater depth below current ground level.

7.13.4 Also, during this phase of the Project, the flood compensation measures would be implemented at Museum Field, land east of Museum Field and at car park X. These works would involve the lowering of the ground levels. The significance of the effect on buried archaeological remains at Museum Field and land to the east would be up to **major adverse** and **minor adverse** (respectively), while an up to **major adverse** effect is predicted with regard to potential palaeochannels at car park X. The effect would be offset by a programme of further archaeological investigation.

7.13.5 The placement of spoil and subsequent construction of the decked car park at Pentagon Field could lead to impacts on buried archaeological remains resulting in a significance of effect up to **moderate adverse**. This effect would be offset through a programme of further archaeological investigation. There would also be a **minor adverse** effect on the character of the historic landscape at Pentagon Field.

7.13.6 The demolition of the former air traffic control tower would represent a **minor adverse** effect that would be offset by recording of the building prior to its demolition.

7.13.7 Environmental mitigation is proposed at parcels of land surrounding Museum Field where planting of trees and hedgerows would be undertaken. Where possible, a programme of archaeological investigation is planned to confirm the date, nature and extent of any archaeological remains, and the results would be reported in the ES. The impact on buried archaeological remains as a result of the environmental mitigation could result in a significance of effect up to **major adverse**.

7.13.8 Appropriate mitigation measures may be incorporated into the establishment of the environmental mitigation land surrounding Museum Field to avoid or reduce damage to the buried archaeological remains. With these measures in place, the significance of effect would be **negligible** to **minor adverse**. Where it is not possible to apply any mitigation measures, the effects would be offset by a programme of further archaeological investigation.

7.13.9 There may also be up to **moderate adverse** effects resulting from impacts on potential buried archaeological remains as a result of the construction of the replacement ‘Purple Parking’ at the western end of Crawter’s Field. These effects would be offset by a programme of archaeological investigation.

7.13.10 The relocation of Pond A and the diversion of the River Mole could impact on possible palaeochannels leading to an effect of up to **moderate adverse** significance. This effect would be offset by a programme of geoarchaeological investigation.

2030-2032

7.13.11 During this phase there would be **minor adverse** effects resulting from changes within the settings of the Grade II* listed Charlwood Park Farmhouse, several Grade II listed buildings at Charlwood and the Conservation Area at Charlwood as a result of the relocation of the CARE facility.

7.13.12 There would be **minor adverse** effects on the significance of the Grade I listed Church of St Nicholas (Charlwood), also The Manor House (Charlwood), Providence Chapel (Charlwood), and **negligible adverse** effects on the significance of the Conservation Area and several Grade II listed buildings at Charlwood as a result of an increase in ground noise.

7.13.13 In addition, there could be a **major adverse** effect arising from impacts on buried archaeological remains during the establishment of the surface access satellite compound north of Longbridge Roundabout and also any environmental mitigation works required within the northern part of Car Park B. Appropriate mitigation measures may be incorporated into the construction works here to avoid or reduce damage to the buried archaeological remains. With these measures in place, the significance of effect would be up to **minor adverse**. Where it is not possible to apply any mitigation measures, the effects would be offset by a programme of further archaeological investigation. There would also be an effect of **minor adverse** significance as a result of the change within the setting of the Church Lane (Horley) Conservation Area.

2033-2038

7.13.14 The construction of the flood storage area east of Gatwick Stream would lead to the complete loss or substantial damage of buried archaeological remains resulting from the reduction of ground levels. This would result in up to a **major adverse** effect which would be offset through a programme of further archaeological investigation.

Design Year 2038

7.13.15 No effects are considered likely during the operational phase of the Project.

Next Steps

7.13.16 A programme of further archaeological investigation will be undertaken ahead of production of the final ES chapter. This will include intrusive works such as trial trenching and/or test-pitting, as well as further non-intrusive works (eg further geophysical survey) as appropriate. The results of any further archaeological investigations will be considered within the ES. Examination will also be made of the results of any relevant Ground Investigation (GI) surveys.

Table 7.13.1: Summary of Effects

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
Construction Phase 2024-2029 (Construction Effects up to first opening of Northern Runway)							
Buried archaeological remains (main contractor compound)	Negligible	Potential loss of or damage to remains from establishment of compound	Permanent	Negligible	Negligible	Not significant	
Setting of heritage assets (main contractor compound)	N/A	Effect on significance of heritage asset	N/A	No change	No change	Not significant	
Buried archaeological remains (airfield satellite compound)	Up to Medium (if any palaeochannels present)	Potential loss of or damage to remains from establishment of compound	Permanent	Negligible	Negligible	Not significant	If the methodology for the establishment of the airfield satellite compound has the potential to impact on buried geoarchaeological remains the effect would be offset through a programme of investigation.
Setting of heritage assets (airfield satellite compound)	N/A	Effect on significance of heritage asset	N/A	No change	No change	Not significant	
Buried archaeological remains (surface access	Up to Medium	Potential loss or damage to remains	Permanent	Up to High	Up to Major Adverse	Significant	Date, nature and extent of any buried archaeological remains

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
works contractor compound – South Terminal roundabout – land north of the M23 motorway spur)		from establishment of compound					not yet ascertained. Proposed programme of archaeological investigation should establish receptor sensitivity. Appropriate mitigation may be implemented during establishment of compound and this would reduce the magnitude of impact. If this is not possible then the effect could be offset through a programme of archaeological investigation.
Setting of heritage assets (surface access works contractor compound – South Terminal roundabout – land north of the M23 motorway spur)	N/A	Effect on significance of heritage asset	N/A	No change	No change	Not significant	
Historic landscape character (surface	Low	Change to historic landscape character	Long term	Low	Negligible	Not significant	Impact is fully reversible.

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
access works contractor compound – South Terminal roundabout – land north of the M23 motorway spur)							
Buried archaeological remains (surface access works contractor compound – North Terminal roundabout	Negligible	Potential loss or damage to remains from establishment of compound	Permanent	Negligible	Negligible	Not significant	
Setting of heritage assets (surface access works contractor compound – North Terminal roundabout	N/A	Effect on significance of heritage asset	N/A	No change	No change	Not significant	
Buried archaeological remains (ground lowering – Museum Field)	Up to Medium	Complete loss or substantial damage resulting from reduction in ground level	Permanent	Up to High	Up to Major Adverse	Significant	Date, nature and extent of any buried archaeological remains not yet ascertained. Effect offset through programme of archaeological investigation.
Buried archaeological remains (flood	Up to Medium	Complete loss or substantial damage	Permanent	Low	Minor Adverse	Not significant	Date, nature and extent of any buried archaeological remains

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
compensation area east of Museum Field)		resulting from reduction in ground level					not yet ascertained. Effect offset through programme of archaeological investigation.
Setting of heritage assets (flood compensation area – Museum Field)	N/A	Effect on significance of heritage asset	N/A	No change	No change	Not significant	
Historic landscape character (Museum Field)	Low	Change to historic landscape character	Permanent	Negligible	Negligible	Not significant	
Deposits of geoarchaeological interest (flood compensation area– Car park X	Low	Complete loss or substantial damage resulting from ground reduction	Permanent	Up to High	Up to Moderate Adverse	Significant	Date, nature and extent of any buried geoarchaeological remains not yet ascertained. Effect offset through programme of investigation.
Setting of heritage assets (flood compensation area – Car park X)	N/A	Effect on significance of heritage asset	N/A	No change	No change	Not significant	
Setting of heritage assets (Car parks X and V)	N/A	Effect on significance of heritage asset	N/A	No change	No change	Not significant	
Buried archaeological remains (Pentagon Field)	Up to Medium	Loss of or damage resulting from placement of spoil	Permanent	High	Up to Major Adverse	Significant	Date, nature and extent of any buried archaeological remains not yet ascertained. Effect

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
		and construction of the decked car park					offset through programme of archaeological investigation.
Setting of heritage assets (decked car park Pentagon Field)	N/A	Effect on significance of heritage asset	N/A	No change	No change	Not significant	
Historic landscape character (Pentagon Field)	Low	Change to historic landscape character	Permanent	High	Minor adverse	Not significant	
Buried archaeological remains (water treatment and runoff storage facility – car park Y)	N/A	Complete loss or substantial damage resulting from ground reduction.	N/A	No change	No change	Not significant	
Setting of heritage assets (water treatment and runoff storage facility – car park Y)	N/A	Effect on significance of heritage asset	N/A	No change	No change	Not significant	
Buried archaeological remains (works to northern runway, new and realigned taxiways, new aircraft stands, reconfiguration of existing	Negligible	Loss of or damage resulting from construction works	Permanent	Negligible	Negligible	Not significant	

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
aircraft stands, Virgin Hangar pavement works, relocation of Rendezvous Point North, Pumping Station 2a)							
Setting of heritage assets (works to northern runway, new and realigned taxiways, new aircraft stands, reconfiguration of existing aircraft stands, Virgin Hangar pavement works, relocation of Rendezvous Point North, Pumping Station 2a)	N/A	Effect on significance of heritage asset	N/A	No change	No change	Not significant	
Buried archaeological remains (relocation of fire training ground)	Negligible	Loss of or damage resulting from relocation	Permanent	Negligible	Negligible	Not significant	
Setting of heritage assets (relocation of fire training ground)	N/A	Effect on significance of heritage asset	N/A	No change	No change	Not significant	

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
Former air traffic control tower	Low	Complete loss (demolition)	Permanent	High	Minor Adverse	Not significant	Offset through programme of building recording prior to demolition
Buried archaeological remains (environmental mitigation land surrounding Museum Field)	Up to Medium	Planting, scrapes, replacement habitats etc	Permanent	High	Up to Major Adverse	Significant	Date, nature and extent of any buried archaeological remains not yet ascertained. Proposed programme of archaeological investigation should establish receptor sensitivity. Appropriate mitigation may be implemented during establishment of compound. and this would reduce the magnitude of impact. If this is not possible then the effect could be offset through a programme of archaeological investigation.
Setting of heritage assets (Multi Storey Car Park J, South Terminal IDL Extension and Forecourt,	N/A	Effect on significance of heritage asset	N/A	No change	No change	Not significant	

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
new hotel at the building compound adjacent to the car rental site, Satellite Airport Fire Service Facility, Airfield Surface Transport Facility, Decked Car Park North Terminal Long Stay Phase 1, North Terminal IDL Extension and Forecourt and Baggage Reclaim Facility Extension, ITTS improvements)							
Buried archaeological remains (Multi Storey Car Park J, South Terminal IDL Extension and Forecourt, new hotel at the building compound adjacent to the car rental site, Satellite Airport Fire Service Facility, Airfield	Negligible	Loss of or damage resulting from construction works	Permanent	No change	No change	Not significant	

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
Surface Transport and Grounds Maintenance Facility, Decked Car Park North Terminal Long Stay Phase 1, North Terminal IDL Extension and Forecourt and Baggage Reclaim Facility Extension, ITTS improvements)							
Buried archaeological remains (replacement 'Purple Parking' at western end of Crawter's Field)	Low	Complete loss or substantial damage resulting from construction of surface car park	Permanent	High	Up to Moderate Adverse	Significant	Date, nature and extent of any buried archaeological remains not yet ascertained. Effect offset through programme of archaeological investigation.
Deposits of geoarchaeological interest (relocation of Pond A and River Mole Diversion)	Up to Medium	Complete loss or substantial damage resulting from construction of River Mole Diversion	Permanent	Medium	Moderate Adverse	Significant	Date, nature and extent of any buried geoarchaeological remains not yet ascertained. Effect offset through programme of investigation if necessary.

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
Setting of heritage assets (relocation of Pond A and River Mole Diversion)	N/A	Effect on significance of heritage asset	N/A	No change	No change	Not significant	
Extension to Dog Kennel Pond	N/A	Effect on significance of heritage asset	N/A	No change	No change	Not significant	
2030-2032 (Construction and Operational Effects)							
Grade II* listed Charlwood Park Farmhouse	High	Change within setting (relocated CARE Facility Option 2)	Permanent	Low	Minor Adverse	Not significant	
Other listed buildings and Conservation Area at Charlwood	High to Medium	Change within setting (relocated CARE facility Option 2)	Permanent	Negligible	Minor Adverse	Not significant	
Setting of heritage assets (replacement Motor Transport Facility, North Terminal baggage hall extension, Decked Car Park North Terminal Long Stay Phase 2,	N/A	Effect on significance of heritage asset	N/A	No change	No change	Not significant	

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
North Terminal Hotel at car park Y, South Terminal Hotel at car park H, multi-storey car park H and new offices, Pumping Station 7a, Substation north of Pier 7, South Terminal Roundabout Improvements, North Terminal Roundabout Improvements, Longbridge Roundabout Improvements)							
Buried archaeological remains (replacement Motor Transport Facility, North Terminal baggage hall extension, Decked Car Park North Terminal Long Stay Phase 2, North Terminal Hotel at car park Y, South	Negligible	Loss of or damage resulting from construction works	Permanent	No change	No change	Not significant	

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
Terminal Hotel at car park H, multi-storey car park H and new offices, Pumping Station 7a, Substation north of Pier 7, South Terminal Roundabout Improvements)							
Buried archaeological remains (Car Park B north of A27 Airport Way)	Up to High	Potential loss or damage to remains from environmental mitigation	Permanent	Up to High	Up to Major Adverse	Significant	Date, nature and extent of any buried archaeological remains not yet ascertained. Appropriate mitigation may be implemented ahead of the environmental mitigation works and this would reduce the magnitude of impact. If this is not possible then the effect could be offset through a programme of archaeological investigation.
Buried archaeological remains (surface access	Up to High	Potential loss or damage to remains	Permanent	Up to High	Up to Major Adverse	Significant	Date, nature and extent of any buried archaeological remains

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
works contractor compound – Longbridge Roundabout)		from establishment of compound					not yet ascertained. Proposed programme of archaeological investigation should establish receptor sensitivity. Appropriate mitigation may be implemented during establishment of compound and this would reduce the magnitude of impact. If this is not possible then the effect could be offset through a programme of archaeological investigation.
Church Lane (Horley) Conservation Area	Medium	Change within setting (surface access works contractor compound Longbridge Roundabout)	Medium term	Low	Minor adverse	Not significant	Proposed compound location is partially within the Conservation Area. Impact is fully reversible.

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
Setting of other heritage assets (surface access works contractor compound – Longbridge Roundabout)	N/A	Effect on significance of heritage asset	N/A	No change	No change	Not significant	
Historic landscape character (surface access works contractor compound – Longbridge roundabout)	Low	Change to historic landscape character	Long term	Low	Negligible	Not significant	Impact is fully reversible.
Grade I listed Church of St Nicholas (Charlwood)	High	Change within setting – ground noise	Long-term	Negligible	Minor Adverse	Not significant	
Grade II* listed The Manor House (Charlwood)	High	Change within setting – ground noise	Long-term	Negligible	Minor Adverse	Not significant	
Grade II* listed Providence Chapel (Charlwood)	High	Change within setting – ground noise	Long-term	Negligible	Minor Adverse	Not significant	
Other listed buildings and Conservation Area at Charlwood	Medium	Change within setting – ground noise	Long-term	Negligible	Negligible Adverse	Not significant	

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
2033-2038 (Construction and Operational Effects)							
Setting of heritage assets (New Hangar, Pier 7, Multi-storey car park Y, North and South Terminal autonomous vehicle stations)	N/A	Effect on significance of heritage asset	N/A	No change	No change	Not significant	
Buried archaeological remains (New Hangar, Pier 7, Multi-storey car park Y, North and South Terminal autonomous vehicle stations)	Negligible	Loss of or damage resulting from construction works	Permanent	No change	No change	Not significant	
Grade II listed Edgeworth House and Wing House	Medium	Change within setting (decked car park Pentagon Field, South Terminal Hotel, car park H, office buildings)	Permanent	No change	No change	Not significant	
Grade II listed Old Cottage and Lilac Cottage	Medium	Change within setting (decked car	Permanent	No change	No change	Not significant	

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
		park Pentagon Field)					
Grade II* Charlwood Park Farmhouse (Bear and Bunny)	High	Change within setting (decked car park North Terminal long stay)	Permanent	No change	No change	Not significant	
Buried archaeological remains (flood compensation area east of Gatwick Stream)	Up to Medium	Complete loss or substantial damage resulting from ground reduction	Permanent	High	Up to Major Adverse	Significant	Date, nature and extent of any buried archaeological remains not yet ascertained. Effect offset through programme of archaeological investigation.
Historic landscape character (flood compensation area east of Gatwick Stream)	Low	Change to historic landscape character	Permanent	Negligible	Negligible	Not significant	
Grade I listed Church of St Nicholas (Charlwood)	High	Change within setting – ground noise	Long-term	Negligible	Minor Adverse	Not significant	
Grade II* listed The Manor House (Charlwood)	High	Change within setting – ground noise	Long-term	Negligible	Minor Adverse	Not significant	

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
Grade II* listed Providence Chapel (Charlwood)	High	Change within setting – ground noise	Long-term	Negligible	Minor Adverse	Not significant	
Other listed buildings and Conservation Area at Charlwood	Medium	Change within setting – ground noise	Long-term	Negligible	Negligible Adverse	Not significant	
Design Year: 2038 (Operational Effects)							
Grade II Brookside and Radford Farmhouse	Medium	Effect on significance of heritage asset	Permanent	No change	No change	Not significant	

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7.15. Glossary

Table 7.15.1: Glossary of Terms

Term	Description
AHAP	Areas of High Archaeological Potential
ANA	Archaeological Notification Area
CARE	Central Area Recycling Enclosure
CEA	Cumulative Effects Assessment
CoCP	Code of Construction Practice
CPRE	Campaign for the Protection of Rural England
CSAI	County Site of Archaeological Interest
dB	Decibel
DBA	Desk Based Assessment
DCO	Development Consent Order
DMRB	Design Manual for Roads and Bridges
EIA	Environmental Impact Assessment
ES	Environmental Statement
GI	Ground Investigation
HER	Historic Environment Records
HLC	Historic Landscape Characterisation
ILS	Instrument Landing System
LiDAR	Light Detecting and Ranging
NHLE	National Heritage List for England
NPPF	National Planning Policy Framework
NPPG	National Planning Practice Guidance
NPS	National Policy Statement
PEIR	Preliminary Environmental Information Report
ZoI	Zone of Influence
ZTV	Zone of Theoretical Visibility

Preliminary Environmental Information Report
Chapter 8: Landscape, Townscape and Visual Resources

September 2021

Table of Contents

8 Landscape, Townscape and Visual Resources

8.1. Introduction

8.1.1 This chapter of the Preliminary Environmental Information Report (PEIR) presents the findings of the Environmental Impact Assessment (EIA) work undertaken to date concerning the potential effects of the proposal to make best use of Gatwick's existing runways (referred to within this report as 'the Project') on landscape, townscape and visual resources.

8.1.2 This chapter assesses the likely significant landscape, townscape and visual effects resulting from the Project. This includes identification of the character and features of the landscape and townscape (landscape within built up areas) and consideration of the changes that would result as a consequence of the Project. In addition, it considers the potential visual effects arising as a result of the Project. The chapter reports on studies, including a combination of field surveys and desktop research, to describe, classify and evaluate the existing resource. The principal objectives of the assessment are:

- to describe, classify and evaluate the existing landscape and townscape likely to be affected by the Project during its construction and operational phases;
- to identify visual receptors with views of the Project; and
- to identify the likely significant effects on landscape, townscape and views, considering measures proposed to reduce or avoid any effects identified.

8.1.3 In particular, this PEIR chapter:

- sets out the existing and future environmental baseline conditions, established from desk studies, surveys and consultation to date;
- presents the potential environmental effects on landscape, townscape and visual resources arising from the Project, based on the information gathered and the analysis and assessments undertaken to date;
- identifies any assumptions and limitations encountered in compiling the environmental information; and
- highlights any necessary monitoring and/or mitigation measures that could prevent, minimise, reduce or offset the possible environmental effects identified in the EIA process.

8.1.4 This chapter is accompanied by a number of appendices and figures listed below:

- Appendix 8.2.1: Summary of Local Planning Policy;
- Appendix 8.3.1: Summary of Stakeholder Scoping Responses;
- Appendix 8.4.1: Landscape, Townscape and Visual Impact Assessment Methodology;
- Appendix 8.6.1: County Landscape Character Assessments;
- Appendix 8.6.2: CPRE Tranquillity Mapping;
- Appendix 8.9.1: Summary of Effects at Representative Viewpoints;
- Figure 8.4.1: Existing and Proposed Zones of Theoretical Visibility (ZTV) within 5 km Radius Study Area;
- Figure 8.4.2: National Landscape Character Areas and Landscape Designations;
- Figure 8.4.3: Existing ZTV and Viewpoint Locations;
- Figure 8.4.4 to Figure 8.4.20: Viewpoints 1 to 17 Photography (winter daytime/summer daytime/winter night time);

- Figure 8.4.21: Aerial Photography and Visual Receptor Locations;
- Figure 8.6.1: Topography;
- Figure 8.6.2: District Landscape and Townscape Character Areas within 5 km Radius;
- Figure 8.6.3: 2018 Baseline Gatwick Overflights;
- Figure 8.6.4: All 2018 Baseline Overflights within 35 mile Radius;
- Figure 8.6.5: Increase in Gatwick Overflights;
- Figure 8.6.6: Increase in Gatwick Overflights Compared with All Overflights; and
- Figure 8.9.1 to 8.9.36: Photomontages.

8.1.5 The PEIR will inform pre-application consultation. Following consultation, comments on the PEIR will be reviewed and taken into account, where appropriate, in preparation of the Environmental Statement (ES) that will accompany the application to the Planning Inspectorate for development consent.

8.2. Legislation and Policy

Legislation

8.2.1 The following legislation is relevant to this assessment:

- European Landscape Convention, 2000;
- Countryside and Rights of Way Act, 2000; and
- National Parks and Access to the Countryside Act, 1949.

8.2.2 The European Landscape Convention (Council of Europe, 2000) acknowledges that the quality and diversity of European landscapes constitute a common resource. The convention defines the meaning of ‘landscape’, and the importance of its characterisation through assessment, its protection, management and planning and its contribution to the quality of life for people everywhere.

8.2.3 The Countryside and Rights of Way Act, 2000, sets out the rights of the public in relation to access land and public rights of way and the designation of Areas of Outstanding Natural Beauty (AONB) for the purpose of conserving and enhancing natural beauty.

8.2.4 The National Parks and Access to the Countryside Act 1949 provides the original framework for the creation of National Parks and AONBs for the purpose of conserving and enhancing natural beauty and also addresses rights of way and access to open land.

Planning Policy Context

National Policy Statements

8.2.5 The Airports National Policy Statement (NPS) (Department for Transport, 2018), although primarily provided in relation to a new runway at Heathrow Airport, remains a relevant consideration for other applications for airport infrastructure in London and the south east of England.

8.2.6 The NPS for National Networks (Department for Transport, 2015) sets out the need for development of road, rail and strategic rail freight interchange projects on the national networks and the policy against which decisions on nationally significant road and rail projects will be

made[1]. This has been taken into account in relation to the highways improvements proposed as part of the Project.

8.2.7 Table 8.2.1 provides a summary of the relevant requirements of these NPSs and how these are addressed within the PEIR.

Table 8.2.1: Summary of NPS Information Relevant to this Chapter

Summary of NPS requirement	How and Where Considered in the PEIR
Airports NPS	
Paragraph 5.213 states *'For airport development, landscape and visual effects also include tranquility effects, which would affect people's enjoyment of the natural environment and recreational facilities. In this context, references to landscape should be taken as covering local landscape, waterscape and townscape character and quality, where appropriate'*.	Landscape and townscape character, condition and quality are described in Section 8.6 of this chapter. Effects on landscape, townscape, visual resources and tranquillity are described in Section 8.9 of this chapter. Cumulative effects on landscape, townscape, visual resources and tranquillity are described in Section 8.11 of this PEIR chapter.
Paragraph 5.214 states *'The landscape and visual assessment should reference any landscape character assessment and associated studies as a means of assessing landscape impacts relevant to the preferred scheme. In addition, the applicant's assessment should take account of any relevant policies based on these assessments in local development documents'*.	Relevant policy is included in Section 8.2 of this chapter. Landscape and townscape character, condition and quality are described in Section 8.6 of this chapter. Effects on landscape, townscape and visual resources and tranquillity are described in Section 8.9 of this chapter. Cumulative effects on landscape, townscape, visual resources and tranquillity are described in Section 8.11 of this PEIR chapter.
Paragraph 5.215 states that the assessment should include *'surface access proposals', 'aviation activity' and 'landscape character, including historic characterisation'*.	The effects of the surface access proposals (highways improvements) are considered within a 5 km radius study area in Sections 8.9 and 8.11 of this chapter. The effects of aviation activity are considered within a 5 km radius study area in Sections 8.9 and 8.11 of this PEIR chapter and effects on tranquillity within nationally designated landscapes within a wider study area for overflying aircraft < 7,000 feet. The effects on the historic landscape are included in Chapter 7 Historic Environment.

[1] It is noted that the Transport Decarbonisation Plan published by Department for Transport (DfT) on 14 July 2021 announced DfT's intention to review the NPS for National Networks in due course once demand patterns post-pandemic become clearer. It is understood DfT intends to commence the review by the end of 2021 and complete it by Spring 2023. In the interim and whilst the review is undertaken, DfT has confirmed the NPS for National Networks remains relevant government policy and has full force and effect for the purposes of the Planning Act 2008.

Summary of NPS requirement	How and Where Considered in the PEIR
Paragraph 5.216 states that *'noise and light pollution effects, including on local amenity, tranquility and nature conservation'* should be included.	The effects of noise in terms of tranquillity and the effects of light generally on night time character and visual amenity have been assessed in Sections 8.9 and 8.11 of this PEIR chapter. The effects on nature conservation are included in Chapter 9 Ecology.
NPS for National Networks	
Paragraph 5.146 states, in relation to the assessment of effects on views and visual amenity that it *'should include any noise and light pollution effects, including on local amenity, tranquility and nature conservation'*.	The effects of noise in terms of tranquillity and the effects of light generally on night time visual amenity have been assessed in Sections 8.9 and 8.11 of this PEIR chapter. The effects on nature conservation are considered in Chapter 9 Ecology and Nature Conservation.

National Planning Policy Framework

8.2.8 The National Planning Policy Framework (NPPF) (Ministry of Housing, Community and Local Government, 2021) sets out the planning policies for England. The document sets out broad aims to achieve sustainable development in Section 2, including an environmental objective *'to protect and enhance our natural, built and historic environment'* at paragraph 8.

8.2.9 Strategic policies regarding Plan-making at Section 3 include, at paragraph 20, a requirement for sufficient provision for *'conservation and enhancement of the natural, built and historic environment, including landscapes and green infrastructure and planning measures to address climate change mitigation and adaption'*.

8.2.10 Section 6: 'Building a strong, competitive economy' recognises that sites may have to be found adjacent to or beyond existing settlements or urban areas. In these circumstances, development *'is sensitive to its surroundings',* which will be important for parts of the Project beyond the existing Gatwick Airport boundary.

8.2.11 Section 8: 'Promoting healthy and safe communities' states at paragraph 92 that development should *'enable and support healthy lifestyles,[…..] for example through the provision of safe and accessible green infrastructure… and layouts that encourage walking and cycling'*. Paragraph 99 states that *'Existing open space [….] Should not be built on unless […] the loss resulting from the proposed development would be replaced by equivalent or better provision in terms of quality and quantity in a suitable location'*. Paragraph 100 states that *'planning policies and decisions should protect and enhance public rights of way and access, including taking opportunities to provide better facilities for users'*. Public open space at Riverside Garden Park and the public rights of way within the Project site form an important element of the EIA process and design development.

8.2.12 Section 9: 'Promoting sustainable transport' requires at paragraph 104 that *'the environmental impacts of traffic and transport infrastructure can be identified, assessed and taken into account – including appropriate opportunities for avoiding and mitigating any adverse effects, and for net*

environmental gains'. Paragraph 112 states that development should *'respond to local character and design standards'.*

8.2.13 Section 11: 'Making effective use of land' recognises the need to safeguard and improve the environment when meeting the needs for development. Paragraph 120 promotes new habitat creation or the improvement of public access to the countryside. Paragraph 124 recognises the *'desirability of maintaining an area's prevailing character and setting (including residential gardens), or of promoting regeneration and change'* and *'the importance of securing well-designed, attractive and healthy places'*. Provision of appropriately designed landscape infrastructure forms an important part of the mitigation strategy for the Project and will continue to be developed throughout the EIA process.

8.2.14 Section 12: 'Achieving well-designed places' includes general policies about achieving high quality and inclusive design for all development (paragraph 130). This is to ensure that developments will function well and add to the overall quality of the area, establish a strong sense of place and create an attractive and comfortable place to live, work and visit. Proposals should optimise the potential of the site to accommodate development. Developments should respond to the local character and history and reflect the identity of the surrounding built environment and landscape setting whilst not discouraging appropriate innovative design. New development should create safe and accessible environments that are visually attractive with appropriate and effective landscaping. Landscape proposals will be appropriately designed to provide functional and attractive infrastructure within the airport and complement the surrounding landscapes and townscapes.

8.2.15 Section 15: 'Conserving and Enhancing the Natural Environment' (paragraph 174) states that *'Planning policies and decisions should contribute to and enhance the natural and local environment by; protecting and enhancing valued landscapes, sites of biodiversity or geological value and soils (in a manner commensurate with their statutory status or identified quality in the development plan)'* and by *'recognising the intrinsic character and beauty of the countryside'* including the benefits of trees and woodland. Paragraph 175 requires that Plans should *'[…] take a strategic approach to maintaining and enhancing networks of habitats and green infrastructure; and plan for the enhancement of natural capital at a catchment or landscape scale across local authority boundaries'*. Paragraph 176 states that '*Great weight should be given to conserving and enhancing landscape and scenic beauty in National Parks, the Broads and Areas of Outstanding Natural Beauty, which have the highest status of protection in relation to these issues'.* Paragraph 185 requires that new development is appropriate to its location and should *'identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason'*, and that the impact on local amenity of light pollution from artificial light is limited within intrinsically dark landscapes. The Project will be designed to avoid or minimise adverse effects on the setting of nationally designated landscapes and the tranquillity enjoyed within them.

National Planning Practice Guidance

8.2.16 The National Planning Practice Guidance (NPPG) (Ministry of Housing, Communities and Local Government, 2019) supports the NPPF and provides guidance across a range of topic areas.

8.2.17 The NPPG refers to nationally designated landscapes including National Parks and AONBs and recommends that *'Land within the setting of these areas often makes an important contribution to maintaining their natural beauty, and when poorly located or designed development can do*

significant harm. This is especially the case where long views from or to the designated landscape are identified as important, or where the landscape character of land within and adjoining the designated area is complementary. Development within the settings of these areas will therefore need sensitive handling that takes these potential impacts into account'. Para: 042 Ref. ID:8-042-20190721. The Project will be designed to avoid or minimise adverse effects on the setting of nationally designated landscapes and the tranquillity enjoyed within them.

Other Relevant National Planning Policy

Airspace Design: CAP 1616 (Civil Aviation Authority (CAA), March 2021)

8.2.18 The CAA document requires that any changes to routes and/or traffic patterns of overflying aircraft at height profiles up to 7,000 feet above ground level should be identified to assess effects on landscape tranquillity and visual receptors. The assessment in this chapter of the PEIR has been defined using guidance within Appendix B 'Environmental metrics and assessment requirements' within CAP1616. Whilst the Project does not propose airspace design change, paragraph B76 contains useful guidance with regard to tranquillity assessment and states *'For the purpose of airspace change proposals, impact upon tranquillity need only be considered with specific reference to Areas of Outstanding Natural Beauty (AONB) and National Parks unless other areas for consideration are identified through community engagement'.* The Project will be designed to avoid or minimise adverse effects on the setting of nationally designated landscapes and the tranquillity enjoyed within them.

Local Planning Policy

8.2.19 Gatwick Airport lies within the administrative area of Crawley Borough Council and adjacent to the boundaries of Mole Valley District Council to the north west, Reigate and Banstead Borough Council to the north east and Horsham District Council to the south west. The administrative area of Tandridge District Council is located approximately 1.9 km to the east of Gatwick Airport, while Mid Sussex District Council lies approximately 2 km to the south east. Gatwick Airport is located in the county of West Sussex and immediately adjacent to the bordering county of Surrey.

8.2.20 The relevant local planning policies applicable to landscape, townscape and visual resources based on the extent of the study area for this assessment are summarised in Table 8.2.2 and explained further in Appendix 8.2.1.

Table 8.2.2: Local Planning Policy

Administrative Area	Plan	Policy
Adopted Policy		
Crawley	Crawley 2030: Crawley Borough Local Plan 2015-2030	Policy CH2: Principles of Good Urban Design
		Policy CH3: Normal Requirements of All New Development
		Policy CH8: Important Views
		Policy CH9: Development Outside the Built-Up Area
		Policy CH10: High Weald Area of Outstanding Natural Beauty
		Policy ENV1: Green Infrastructure
		Policy CS2: Valued Landscapes and the Natural Environment

Administrative Area	Plan	Policy
Reigate and Banstead	Reigate and Banstead Local Plan: Adopted Core Strategy 2014	Policy CS3: Green Belt
		Policy CS12: Infrastructure Delivery
	Reigate and Banstead Borough Development Management Plan 2018-2027 (Adopted 2019)	Policy NHE1: Landscape Protection
		Policy NHE3: Protecting Trees, Woodland Areas and Natural Habitats
		Policy NHE4: Green/blue Infrastructure
Mole Valley	Mole Valley Core Strategy 2009	Policy CS13: Landscape Character
		Policy CS 14: Townscape, Urban Design and the Historic Environment
	Mole Valley Local Plan 2000 (saved policies)	Policy ENV4 Landscape Character
		Policy ENV22 General Development Control Criteria
		Policy ENV23 Respect for Setting
		Policy ENV25 Landscape Design of New Developments
Tandridge	Tandridge District Core Strategy 2008	Policy CSP 18 Character and Design
		Policy CSP 21 Landscape and Countryside
	Tandridge Local Plan Part 2: Detailed Policies 2014 - 2029	Policy DP7: General Policy for New Development
		Policy DP10: Green Belt
Mid Sussex	Mid Sussex District Plan 2014-2031	Policy DP16: High Weald Area of Outstanding Natural Beauty
	Mid Sussex District Local Plan 2004 (saved policies)	Policy CP1: Countryside
High Weald Joint Advisory Committee	High Weald Area of Outstanding Natural Beauty Management Plan 2019 - 2024	Objective OQ3: *'To develop and manage access to maximise opportunities for everyone to enjoy, appreciate and understand the character of the AONB while conserving its natural beauty'*. Objective OQ4: *'To protect and promote the perceptual qualities that people value – aircraft noise – dark skies – scenic impact of intrusive development on valued views'*.

Administrative Area	Plan	Policy
Surrey Hills AONB Board	Surrey Hills Area of Outstanding Natural Beauty Management Plan 2020 to 2025	Policy RT3: *'Significant viewpoints and vistas will be identified, conserved and enhanced'*. Policy P2: *'Development will respect the special landscape character of the locality, giving particular attention to potential impacts on ridgelines, public views and tranquility'.* Policy P6: *'Development that would spoil the setting of the AONB, by harming public views into or from the AONB, will be resisted'*.
Kent Downs AONB Unit	Kent Downs Area of Outstanding Natural Beauty Management Plan 2014 - 2019	*Sustainable Development Policy SD6: 'Activities to increase understanding of the importance and extent of tranquility, remoteness and 'dark night skies' within the Kent Downs and the factors that affect them, will be supported and pursued'*. *Sustainable Development Policy SD8: 'Proposals which negatively impact on the distinctive landform, landscape character, special characteristics and qualities, the setting and views to and from the AONB will be opposed unless they can be satisfactorily mitigated'*.
South Downs National Park Authority	South Downs Local Plan 2014 to 2033	Objective 1: '*To conserve and enhance the landscapes of the National Park'.* Strategic Policy SD6: Safeguarding Views Strategic Policy SD7: Relative Tranquility Strategic Policy SD8: Dark Night Skies Strategic Policy SD23: Sustainable Tourism
Emerging Policy		
Crawley	Draft Crawley Borough Local Plan 2021-2037	Policy SD1: Presumption in Favour of Sustainable Development
		Policy CL2: Making Successful Places: Principles of Good Urban Design
		Policy CL3: Movement Patterns, Layout and Sustainable Urban Design
		Policy CL5: Development Briefs and Masterplanning
		Policy CL6: Structural Landscaping
		Policy CL7: Important and Valued Views
		Policy CL8: Development Outside the Built-Up Area
		Policy CL9: High Weald Area of Outstanding Natural Beauty
		Policy DD1: Normal Requirements of All Design
		Policy DD2: Inclusive Design
		Policy DD4: Tree Replacement Standards
		Policy DD5 Aerodrome Safeguarding
		Policy OS1: Open Space, Sport and Recreation
		Policy OS3: Rights of Way and Access to Countryside
		Policy GI1: Green Infrastructure
Tandridge		Policy TLP03: Green Belt
		Policy TLP32: Landscape Character

Administrative Area	Plan	Policy
	Our Local Plan 2033 Tandridge District Council	Policy TLP33: Surrey Hills and High Weald Areas of Outstanding Natural Beauty
Mole Valley	Future Mole Valley 2018 to 2033 Consultation Draft Local Plan	Policy EN1: Development in the Green Belt Policy EN4: Design and Character Policy EN8: Landscape Character
Kent Downs AONB Unit	Kent Downs Area of Outstanding Natural Beauty Draft for Consultation Management Plan 2020 - 2025	*Sustainable Development Policy SD6: 'Activities to increase understanding of the importance and extent of tranquility, remoteness and 'dark night skies' within the Kent Downs will be pursued'*. *Sustainable Development Policy SD8: 'Ensure proposals, projects and programmes do not negatively impact on the distinctive landform, landscape character, special characteristics and qualities, the setting and views to and from the AONB'*.

8.3. Consultation and Engagement

8.3.1 In September 2019, GAL submitted a Scoping Report to the Planning Inspectorate, which described the scope and methodology for the technical studies being undertaken to provide an assessment of any likely significant effects and, where necessary, to determine suitable mitigation measures for the construction and operational phases of the Project. It also described those topics or sub-topics which are proposed to be scoped out of the EIA process and provided justification as to why the Project would not have the potential to give rise to significant environmental effects in these areas.

8.3.2 Following consultation with the statutory bodies, the Planning Inspectorate (on behalf of the Secretary of State) provided a Scoping Opinion on 11 October 2019.

8.3.3 Key issues raised during the scoping process specific to landscape, townscape and visual resources are listed in Table 8.3.1, together with details of how these issues have been addressed within the PEIR.

Table 8.3.1: Summary of Scoping Responses

Details	How/where addressed in PEIR
Extent of study area: Review 5 km radius study area when description of development is fixed and include 50 metre high stack at the Central Airfield Maintenance and Recycling (CARE) facility. (PINS ID 4.2.1) Agree study area with relevant consultees. Visual effects of overflying aircraft on heritage assets.	The preliminary 5 km radius study area is sufficient to inform the PEIR. The Project description continues to be refined and, therefore, this will be reviewed for the final ES. A preliminary location for the CARE facility 50 metre high stack has been included in the ZTV, together with maximum parameters, as a worst case scenario to ensure the study area is sufficient to ensure all impacts that could give rise to potential significant effects on landscape, townscape and visual resources are assessed. Effects of overflying aircraft on heritage assets are addressed in Chapter 7: Historic Environment of the PEIR.
Extent of tranquility study area: Defined according to CAP1616. The assessment should take account of land elevation, which could result in aircraft over 7,000 feet above mean sea level being less than 7,000 feet. (PINS ID 4.2.2)	The extent of the tranquility study area has been determined through an appropriate methodology (to accommodate specific criteria in CAP1616 Appendix B (para B30), which defines overflights up to 7,000 ft above ground level)
Refers to guidance documents. An Approach to Landscape Character Assessment (Natural England, October 2014) and Technical Guidance Note 06/19: Visual Representation of Development Proposals (Landscape Institute) (PINS ID 4.2.4)	Documents included in methodology in Section 8.4 of this chapter.
Zone of Theoretical Visibility: Relate to maximum parameters including flue stack and agreed with consultees. (PINS ID 4.2.5)	A preliminary location for the CARE facility 50 metre high stack has been included in the ZTV, together with maximum parameters, as a worst case scenario to ensure the study area is sufficient to ensure all impacts that could give rise to potential significant effects on landscape, townscape and visual resources are assessed. GAL will seek to obtain agreement with consultees regarding the parameters of the ZTV.
Methodology: To include Guidelines for Landscape and Visual Impact Assessment 3rd Edition (GLVIA3) (Landscape Institute and Institute of Environmental Management and Assessment, 2013) (PINS ID 4.2.6)	Methodology set out in Section 8.4 refers to GLVIA3 and clearly defines all criteria including sensitivity, magnitude and significance of effect.
Baseline studies: Describe surveys and studies undertaken, timing and if professional judgement applied. (PINS ID 4.2.7) Agree with consultees.	Baseline information has been gathered through a combination of desk studies, consultation and field surveys. Baseline photography includes summer/winter and day/night. See methodology in Section 8.4 of this chapter of the PEIR.

Details	How/where addressed in PEIR
	GAL will seek to obtain agreement with consultees regarding the baseline surveys/studies.
Representative viewpoints and visualisations: To include views from High Weald AONB, Kent Downs and Surrey Hills AONBs and Important Viewpoints identified in Crawley Borough Local Plan. (PINS ID 4.2.8)	Viewpoints include High Weald AONB and Tilgate Hill 'Important Viewpoint'. See Visual Resources in Section 8.6 of this chapter of the PEIR. Target Hill 'Important Viewpoint' was scoped out of assessment as there is no intervisibility with Gatwick. Viewpoint photography within Kent Downs and Surrey Hills AONBs is not relevant to assessment of landscape, townscape and visual effects, due to the distance from Gatwick and lack of/limited intervisibility. Appropriate preliminary visualisations have been undertaken in accordance with Technical Guidance Note 06/19: Visual Representation of Development Proposals (Landscape Institute, 2019).
Tranquility study area: Should be mapped on nationally designated landscapes and orientation and frequency of aircraft movements. An assessment of effects should include users of public rights of way and residents, during the day and night and within the South Downs National Park International Dark Skies Reserve, visitors to heritage assets and historic parks and gardens. (PINS ID 4.2.9)	The extent of the tranquility study area has been determined through an appropriate methodology (to accommodate specific criteria in CAP1616 Appendix B para B30) and incorporated into baseline data for nationally designated landscapes and character areas. See Figure 8.4.2. This informs the assessment including night-time effects and the South Downs National Park International Dark Skies Reserve in Section 8.9 of this chapter of the PEIR. Effects of overflying aircraft on heritage assets are addressed in Chapter 7 of the PEIR.
Visible plumes and Residential Visual Amenity Assessment (RVAA): If a visible plume is produced it should be assessed and if a RVAA is undertaken it should be included in the LVIA. (PINS ID 4.2.10)	Due to the limited intervisibility of visual receptors within the study area and the very limited number of likely significant effects, there is no requirement for an RVAA. The potential for a visible plume at the CARE facility will be considered during the EIA process and reported, if required, in the ES.
Assessment years and mitigation. Mitigation planting and its implementation should be defined and included in assessment of effects throughout assessment years, and any visualisations. (PINS ID 4.2.11)	Timing of proposed planting is defined, and the level of mitigation achieved throughout the assessment years is set out in Sections 8.8 and 8.9 of this chapter of the PEIR.
Lighting: Assessment should reference The Guidance Notes for the Reduction of Obtrusive Light (Institution of Lighting Professionals, 2011) (PINS ID 4.2.12)	A lighting strategy is being developed, which will take into account relevant guidance. The final ES will consider effects arising from lighting, taking into account the lighting strategy.

8.3.4 Key issues raised during consultation and engagement with interested parties specific to landscape, townscape and visual resources are listed in Table 8.3.2, together with details of how these issues have been addressed within this chapter of the PEIR.

Table 8.3.2: Summary of Consultation

Consultee	Date	Details	How/where addressed in PEIR
Crawley Borough Council, Reigate and Banstead Borough Council, Mole Valley Borough Council, Tandridge Borough Council, Mid Sussex District Council, Surrey County Council and West Sussex County Council	20.8.2019	Presentation at Gatwick Airport of key aspects of Landscape, Townscape and Visual Resources within Scoping Report. No specific issues were raised in relation to this topic.	NA
Crawley Borough Council, Reigate and Banstead Borough Council, Mole Valley Borough Council, Tandridge Borough Council, Mid Sussex District Council, Surrey County Council and West Sussex County Council	3.2.2020	Presentation at Gatwick Airport of key aspects of Landscape, Townscape and Visual Resources baseline and assessment findings within PEIR. No specific issues were raised in relation to this topic.	NA
Natural England	25.6.2021	MS Teams Meeting. Presentation of landscape tranquility methodology based on CAA CAP 1616 Airspace Change document, and air quality HRA. Natural England recommended consultation with High Weald AONB.	NA
High Weald AONB Joint Advisory Committee	29.6.2021	Email to Landscape Officer seeking consultation on methodology including landscape tranquility.	NA
High Weald AONB Joint Advisory Committee	1.7.2021	Email from High Weald AONB stating overall duty and purpose and specifically AONB Management Plan Objectives OQ4 and G3. Response referred back to two HWAONB consultation responses in 2019 regarding airspace modernization programme and Gatwick masterplan.	NA
Crawley Borough Council, Surrey County Council, Reigate and Banstead Borough Council, Mole Valley Borough Council, Tandridge Borough Council, Horsham Borough Council and Mid Sussex District Council	29.7.2021	Presentation via MS Teams summarizing Landscape, Townscape and Visual Resources progress before Project pause due to Covid, current situation, any changes to assessment in PEIR and ongoing work.	NA

8.4. Assessment Methodology

Relevant Guidance

8.4.1 As a matter of best practice, this assessment has been undertaken based on the relevant guidance on landscape and visual assessment. This includes:

- Guidelines for Landscape and Visual Impact Assessment 3rd Edition (GLVIA3) (Landscape Institute and Institute of Environmental Management and Assessment, 2013);
- An Approach to Landscape Character Assessment (Natural England, 2014);
- Landscape Character Assessment – Guidance for England and Scotland (The Countryside Agency and Scottish Natural Heritage, 2002);
- Airspace Design: CAP 1616 (Civil Aviation Authority, 2021);
- Tranquillity – An Overview, Technical Information Note 1/17 (Landscape Institute, 2017); and
- Technical Guidance Note 06/19: Visual Representation of Development Proposals (Landscape Institute, 2019)

Scope of the Assessment

8.4.2 The scope of this PEIR has been developed in consultation with relevant statutory and non-statutory consultees as detailed in Table 8.3.1 and Table 8.3.2. This PEIR chapter includes an appraisal of the landscape, townscape and visual baseline conditions within the study area and their value and sensitivity to change as a result of the Project. The relevant aspects of the Project are described and the effects on landscape, townscape and visual resources assessed. Design development and mitigation measures are described which would minimise adverse effects. This chapter includes a summary of the methodology, with an extended version of the methodology contained within Appendix 8.4.1.

8.4.3 Taking into account the scoping and consultation process, Table 8.4.1 summarises the issues considered as part of this assessment.

Table 8.4.1: Issues Considered within the Assessment

Activity	Potential Effects
Construction Phase (including Demolition): Landscape/Townscape Characters	
Construction and demolition activities (generally)	Change in character (to landscape designations/types/areas) as a result of construction activity (including lighting).
Construction of updated highways junctions	Change in character (to landscape designations/types/areas, specifically Riverside Garden Park) as a result of construction of upgraded highway junctions (including lighting).
Use of construction compounds and creation of mitigation areas	Change in character (to landscape designations/types/areas) as a result of use of construction compounds and creation of mitigation/enhancement areas (including lighting) beyond the existing airport boundary. Specifically, effects of new attenuation ponds excavation/River Mole floodplain.

Activity	Potential Effects
Construction Phase (including Demolition): Visual Effects	
Construction and demolition activities	Effects on views as a result of demolition and construction activity (including lighting). Likely scope of assessment to focus on the following elements of the Project that have some potential to result in significant effects on visual resources: construction of upgraded highway junctions, decked parking at Pentagon Field, attenuation ponds and use of construction compounds.
Operational Phase: Landscape/Townscape Character	
Use of airport, including upgraded highway junctions	Change in character as a result of operational activity (including tranquillity). Likely scope of assessment to focus on the following elements of the Project that have some potential to result in significant effects on landscape/townscape: extension to North and South Terminals, new hotels, new office blocks, multi-storey and decked car parks, surface access improvements, attenuation ponds/River Mole floodplain and lighting.
Operational Phase: Visual Effects	
Use of airport, including upgraded highway junctions	Effects on views as a result of airport and operational activities and moving and stationary aircraft (including effects on tranquillity). To include consideration of day time and night time effects. Likely scope of assessment to focus on the following elements of the Project that have some potential to result in significant effects on visual resources: extension to North and South Terminals, new hotels, new office blocks, multi-storey and decked car parks, surface access improvements, attenuation ponds/River Mole floodplain, and lighting.

8.4.4 Effects which are not considered likely to be significant have been scoped out of the assessment. A summary of the effects scoped out are presented in Table 8.4.2.

Table 8.4.2: Issues Scoped Out of the Assessment

Issue	Justification
Effects on seascape character	The West Sussex coastline is approximately 35 km from Gatwick Airport and lies outside the study areas, including the study area for overflying aircraft below 7,000 feet, which informs the assessment of effects on tranquillity. Therefore, there would be no change or impact on receptors within this area. This approach was agreed by the Planning Inspectorate in the Scoping Opinion of October 2019, at ID ref. 4.2.3 of the Aspect Based Scoping Tables.
Effects which may arise as a result of reconfiguration of internal spaces within existing buildings/structure, eg amendments to the cargo hall and redevelopment of internal spaces within North and South Terminals.	No external works or changes to the building appearance. Therefore, no pathway for impacts on landscape, townscape or visual amenity.

Study Area

8.4.5 The existing and proposed ZTVs have informed the extent of the study area to ensure that all landscape, townscape and visual receptors that may experience significant effects are captured (see Figure 8.4.1).

8.4.6 An area of search based on a 5 km radius from the Project site boundary has been identified, as the ZTV indicates that the vast majority of land that may be potentially intervisible with development at Gatwick Airport lies within this area. This has defined an appropriate study area to capture the relevant landscape, townscape and visual receptors that are likely to be affected by the Project and to ensure that all likely significant effects have been identified.

8.4.7 A separate wider study area has been established to coincide with overflying aircraft at height profiles up to 7,000 feet above ground level to address effects on landscape tranquillity and visual receptors. This study area is considered appropriate to capture receptors in the wider rural landscape, including the High Weald AONB, Surrey Hills AONB, Kent Downs AONB and South Downs National Park (see Figure 8.4.2).

Methodology for Baseline Studies

8.4.8 The baseline assessment includes an appraisal of the landscape and townscape within the study area. The studies identify the landscape/townscape resources and character, including individual features, key characteristics and the wider landscape/townscape character.

8.4.9 Baseline information on the landscape/townscape has been gathered through a combination of desk studies, consultation and field surveys.

Desk Study

8.4.10 The scope of work has included the following core activities:

- a review of relevant planning policy related to landscape/townscape and visual issues; and
- a desk study and web search of relevant background documents and maps, including reviews of aerial photography, web searches, county and local planning authority publications, National Park and AONB publications and relevant landscape character assessments for the Project site and study areas.

8.4.11 Documents used to inform the assessment include aerial photographs, Ordnance Survey maps and published landscape character assessments.

8.4.12 Relevant national, county and district landscape character assessments have been reviewed. Particular attention has been paid to the key landscape characteristics of the relevant landscape types/character areas and special qualities of the High Weald AONB, Surrey Hills AONB, Kent Downs AONB and South Downs National Park. Valued landscape resources have been identified at national and local levels.

Site-Specific Surveys

8.4.13 The scope of work has included the following field assessments and photographic surveys of the character and fabric of the Project site and its surroundings, and of the views available to and from the Project site. Field surveys allow a better understanding of the landscape, to determine its character, condition (quality), value and intrinsic sensitivity and identify visual receptors and visual

barriers. The surveys have established the landscape and townscape resources that combine to give the landscape and townscape a distinct sense of place.

8.4.14 A series of representative daytime summer and winter views and winter night time views have been identified and these are shown on Figures 8.4.1 and 8.4.3 with panoramic photography at Figures 8.4.4 to 8.4.20. The representative viewpoints have been used to assess the potential visual impacts of the Project on the different range of views within or towards the Project site. The selected viewpoints include views within the Project site or from close quarters through to distant views in which the Project site is part of a wider landscape. Further viewpoints will be identified and added to the assessment process, as required in consultation with local authorities and Natural England.

8.4.15 The landscape, townscape and visual assessment process has identified the existing 'baseline' and projected 'future baseline' condition, value and character of the landscape/townscape and its visual relationship with its surroundings, building on the initial appraisal of existing baseline conditions. The future baseline within the identified assessment years (see PEIR Chapter 6) as a result of committed or consented developments has also been described.

Tranquillity

8.4.16 This section reviews commentary and guidance on tranquillity assessment from key sources including the Landscape Institute, Natural England (and its predecessor the Countryside Agency) and the Campaign to Protect Rural England (CPRE) to define tranquillity for the purposes of this chapter of the PEIR.

8.4.17 The assessment of effects on tranquillity has been informed by guidance contained within 'Tranquillity – An Overview, Technical Information Note 1/17'. (Landscape Institute, 2017). The Technical Information Note states that:

'Tranquillity is defined as a consideration in planning, particularly in England's NPPF and is a recognised factor in the landscape characterisation process. However, how it is actually considered in practice is not clear and there is limited documented evidence to demonstrate how tranquillity assessment is carried out'.

8.4.18 Professional judgement will be used to interpret the public perception of tranquillity, based on the following key aspects identified within the Countryside Agency's 'Research Paper CRN 92' (Countryside Agency, 2005) following a public perception study:

- perceived links to nature and natural features (seeing, hearing and experiencing);
- natural landscapes, open views and night skies;
- the importance of wildlife; and
- peace, quiet and calm - the absence of people and a feeling of 'getting away from it all'.

8.4.19 The perceptual aspects that the public considered not to be tranquil included the following:

- large concentrations of people;
- traffic including noise;
- industrial and commercial development;
- lighting; and
- low flying aircraft.

8.4.20 CPRE undertook tranquillity mapping between 1991 and 1995 to create the first map of tranquil areas. CPRE's definition of tranquillity includes:

'places that are sufficiently far away from the visual or noise intrusion of development or traffic to be considered unspoilt by urban influences'.

8.4.21 Subsequent mapping projects on behalf of CPRE included subjective factors to define relative levels of tranquillity as follows:

'remoteness from people, habitat type, presence and visibility of rivers and woodlands, presence and visibility of unnatural features and detractors, openness of the landscape, overhead skyglow and identification of noise sources'.

Assessment Criteria and Assignment of Significance

8.4.22 The significance of an effect is determined based on the sensitivity of a receptor and the magnitude of an impact. This section describes the criteria applied in this chapter to characterise the sensitivity of receptors and magnitude of potential impacts. The terms used to define magnitude and sensitivity are based on and have been adapted from those used in the Design Manual for Roads and Bridges (DMRB) methodology (Highways England *et al*., 2020), which is described in further detail in Chapter 6: Approach to Environmental Assessment.

Receptor Sensitivity/Value

8.4.23 The sensitivity or susceptibility of a landscape or townscape to change varies according to the nature of the existing resource and the nature of the proposed change. Considerations of value, integrity and capacity are all relevant when assessing sensitivity. For the purpose of this assessment, these terms are defined as follows.

- Value: the relative value that is attached to different landscapes by society. A landscape may be valued by different stakeholders for a variety of reasons. Landscapes can be recognised through national, regional or local designation. Views tend not to be designated, but value can be recognised through a named location shown on a map, or through the creation of a parking lay-by or location of a bench to appreciate a view.
- Integrity: the degree to which the value has been retained, the condition and integrity of the landscape or the view.
- Capacity: the ability of a landscape, townscape or view to accommodate the proposed change while retaining the essential characteristics which define it.

8.4.24 Sensitivity, or susceptibility, is not readily graded in bands. However, in order to provide both consistency and transparency to the assessment process, Tables 8.4.3 and 8.4.4 below define the criteria which have guided the judgement as to the sensitivity of the receptor and the susceptibility to change.

8.4.25 The sensitivity of the landscape and townscape character areas to the type of change associated with the Project has been considered, based on guidance contained within GLVIA3. Table 8.4.3 below summarises criteria used to assess the sensitivity of the landscape to change.

Table 8.4.3: Landscape/Townscape Sensitivity Criteria

Sensitivity	Definition
Very High	Landscape/townscape value recognised by international or national designation. The landscape/townscape resource has very little ability to absorb change of the type proposed without fundamentally altering its present character and is of very high importance, rarity and value. Sense of tranquillity or remoteness specifically noted in landscape character assessment. High sensitivity to disturbance specifically noted in landscape character assessment. The qualities for which the landscape/townscape is valued are in good condition, with a clearly apparent distinctive character and absence of detractors. Very limited potential for substitution.
High	Landscape/townscape value recognised by national designation. The landscape/townscape resource has little ability to absorb change of the type proposed without fundamentally altering its present character and/or is of high importance, rarity or value. Sense of tranquillity or remoteness specifically noted in landscape character assessment. High sensitivity to disturbance specifically noted in landscape character assessment. The qualities for which the landscape/townscape is valued are in good condition, with a clearly apparent distinctive character and absence of detractors. Limited potential for substitution.
Medium	Landscape/townscape value is recognised or designated locally. The landscape/townscape resource has moderate capacity to absorb change of the type proposed without significantly altering its present character and/or is of medium importance, rarity or value. The landscape/townscape is relatively intact, with a distinctive character and some detractors; and is reasonably tolerant of change. Limited potential for substitution.
Low	The landscape/townscape resource is tolerant of change of the type proposed without detriment to its character and/or is of low importance, rarity or value. Landscape/townscape integrity is low, with a poor condition with the presence of detractors; and the landscape/townscape has the capacity to potentially accommodate high levels of change.
Negligible	The landscape/townscape resource is tolerant of change of the type proposed without detriment to its character and/or is of low importance, rarity or value. Landscape/townscape integrity is low, with a poor condition and a degraded character with the presence of detractors such as dereliction; and the landscape/townscape has the capacity to potentially accommodate considerable change.

8.4.26 The sensitivity of visual receptors has been assessed, based on guidance contained within GLVIA3. Sensitivity is dependent upon several factors including the location and context of the viewpoint, whether views are continuous, fragmented, or intermittent (ie the dynamic nature of a view gained while travelling through an area), the importance of views and the occupation and activity of the visual receptor. Influences such as the number of receptors affected, popularity of views and the significance of the views in relation to valued landscapes or features also determine the importance of views.

Table 8.4.4: Visual Sensitivity Criteria

Sensitivity	Definition
Very High	Large number of viewers whose attention is very likely to be focused on the landscape within nationally designated landscapes of high tranquillity. Eg users of strategic recreational footpaths and cycleways; people experiencing views from important landscape features of physical, cultural or historic interest, beauty spots and picnic areas.
High	Large number of viewers whose attention is likely to be focused on the landscape. Eg residents experiencing views from dwellings; users of strategic recreational footpaths and cycleways; people experiencing views from important landscape features of physical, cultural or historic interest, beauty spots and picnic areas. Occupiers of vehicles in highly scenic areas or on recognised tourist routes.
Medium	Viewers' attention may be focused on landscape, such as users of pavements, footways and secondary footpaths in urban areas, and people engaged in outdoor sport or recreation eg horse riding or golf. Occupiers of vehicles in rural areas.
Low	People at their place of work, or engaged in similar activities, whose attention may be focused on their work or activity and who may therefore be potentially less susceptible to changes in view. Occupiers of vehicles whose attention may be focused on the road.
Negligible	People at their place of work, or engaged in similar activities, whose attention may be focused on their work or activity and who may therefore be potentially less susceptible to changes in view. Occupiers of vehicles in urban areas.

Magnitude of Impact

8.4.27 The next stage of the assessment process has identified the potential magnitude of change to landscape or townscape character and views arising from the Project. The assessment distinguishes between landscape or townscape impacts and impacts upon views, based on guidance contained within GLVIA3. The former considers the impact upon landscape or townscape character taking account of impacts upon the physical resource (landform, vegetation, pattern, etc.) and any impacts arising from the Project, which would be sufficient to impact on the inherent character of a landscape or townscape area. The latter considers the impact on views perceived by people from publicly accessible locations. Potential impacts are also considered in terms of their duration ie whether they are permanent or temporary.

8.4.28 The magnitude or scale of change brought about by the Project upon both the existing landscape or townscape resource and upon views, both beneficial and adverse, has been assessed as set out in Table 8.4.5 below.

Table 8.4.5: Impact Magnitude Criteria

Magnitude of Impact	Definition
High	The proposed change forms a dominant or immediately apparent feature that would significantly alter and change view. Where there are substantial changes affecting the character of the landscape/townscape, or important elements through loss of or severe damage to key existing characteristics, features or elements. Proposed development within affected landscape/townscape. Scale, mass and form of development out of character with existing elements. Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements (adverse).
	Large scale or major improvement of landscape/townscape character or view; extensive restoration or enhancement of quality (beneficial).
Medium	The proposed change forms a prominent new element that would affect and change the view. The proposed development forms a visible and recognisable feature in the landscape/townscape. Proposed development is within or adjacent to affected landscape/townscape. Scale of development fits with existing features. Partial loss of/damage to key characteristics, features or elements, but not adversely affecting the integrity of landscape/townscape (adverse).
	Moderate scale improvement of landscape/townscape character or view; partial restoration or enhancement of quality (beneficial).
Low	The proposed change constitutes only a minor component of view, which is recognisable, although might be missed by the casual observer. Awareness of the proposed change would not change the overall nature and character of the view. Receptor may be located at distance from the Project. Minor loss of, or alteration to, one (maybe more) key characteristics, features or elements (adverse).
	Minor benefit to, or addition of, one (maybe more) key landscape/townscape characteristics, features or elements or improvement in quality of view due to partial restoration or enhancement (beneficial).
Negligible	Only a very small part of the proposed change would be discernible, and/or it is at such a distance that it would be scarcely appreciated. Consequently, it would have very little effect on view. The effect of change on the perception of the landscape/townscape, the physical characteristics, features or elements is barely discernible (adverse).
	Very minor benefit to or positive addition of one or more landscape/townscape characteristics, features or elements (beneficial).
No Change	No loss of or alteration to landscape/townscape characteristics, features or elements; no observable adverse or beneficial impact.

Significance of Effect

8.4.29 The significance of the effect upon landscape, townscape or visual resources has been determined by taking into account the sensitivity of the receptor and the magnitude of the impact. The method employed for this assessment has taken into account the matrix presented in Table 8.4.6. The assessment matrix provides a framework for the assignment of levels of effect for each impact identified, together with professional judgement. Where a range of significance levels are presented, the final assessment for each effect is based upon professional judgement.

8.4.30 In all cases, the evaluation of receptor sensitivity, impact magnitude and significance of effect has been informed by professional judgement and is underpinned by narrative to explain the conclusions reached.

8.4.31 For the purpose of this assessment, any effects with a significance level of moderate or less are not considered to be significant.

Table 8.4.6: Assessment Matrix

Sensitivity	Magnitude of Impact				
	No Change	Negligible	Low	Medium	High
Negligible	No change	Negligible	Negligible or Minor	Negligible or Minor	Minor
Low	No change	Negligible or Minor	Negligible or Minor	Minor	Minor or Moderate
Medium	No change	Negligible or Minor	Minor	Moderate	Moderate or Major
High	No change	Minor	Minor or Moderate	Moderate or Major	Major or Substantial
Very High	No change	Minor	Moderate or Major	Major or Substantial	Substantial

8.4.32 A description of the levels of effect is provided in the bullets below:

- Substantial: Where the proposed changes cannot be mitigated; would be completely uncharacteristic and would substantially damage the integrity of a valued and important landscape or townscape. Where the proposed changes would form the dominant feature or would be completely uncharacteristic and substantially change the scene in highly valued views. Only adverse effects are normally assigned this level of significance. They represent key factors in the decision-making process.
- Major: Where the proposed changes cannot be fully mitigated; would be uncharacteristic and would damage a valued aspect of the landscape or townscape. Where the proposed changes would form a major part of the view, or would be uncharacteristic, and would alter valued views. These beneficial or adverse effects are considered to be very important considerations and are likely to be material in the decision-making process.
- Moderate: Where some elements of the proposed changes would be out of scale or uncharacteristic of an area. Where the proposed changes to views would be prominent, out of scale or uncharacteristic with the existing view. These beneficial or adverse effects may be important but are not likely to be key decision-making factors. The cumulative effects of

such factors may influence decision-making if they lead to an increase in the overall adverse effect on a particular resource or receptor.

- Minor: Where the proposed changes would be at slight variance with the character of an area. Where the proposed changes to views would be recognisable or at slight variance with the existing view. These beneficial or adverse effects may be raised as local factors. They are unlikely to be critical in the decision-making process but are important in enhancing the subsequent design of the Project.
- Negligible: Where the proposed changes would be barely discernible within the landscape/townscape or have a barely discernible influence over a landscape/townscape. Where the proposed changes would be barely discernible within the existing view.

8.4.33 In the assessment those levels of effect indicated as being 'substantial' or 'major' may be regarded as significant effects for EIA purposes. An accumulation of individual 'moderate' effects, for instance experienced by a visual receptor during a journey, may also be regarded as a significant sequential effect. Where negligible adverse and beneficial effects occur within the same view or same landscape/townscape, the effect may be described as neutral on balance.

8.4.34 Long term, day time operational effects form the primary focus of this assessment as these are most likely to result in significant effects. All assessment conclusions are supported by reasoned justification.

8.5. Assumptions and Limitations of the Assessment

8.5.1 Assumptions associated with the assessment of landscape and visual effects are based on either:

- the ability to retain existing vegetation to protect landscape or townscape character and screen views of the Project and/or existing development at Gatwick Airport;
- the need to completely remove existing vegetation to provide suitable access for construction activities and/or to accommodate the Project; and/or
- the provision of mitigation planting to replace removed planting and, in the long term, restore or enhance character and screen views of the Project and/or existing development at Gatwick Airport.

8.5.2 The assessment scenarios that have been assumed for specific elements of the Project are described below and the approach to mitigation and enhancement measures is defined in Section 8.8 of this chapter.

8.5.3 Partial retention of existing vegetation:

- A23/M23 spur surface access improvements corridor (North Terminal, South Terminal and Longbridge Roundabouts);
- South Terminal hotel/car park H and office blocks;
- Pentagon Field decked car park;
- Replacement Purple Parking at Crawter's Field;
- Gatwick Museum flood compensation area; and
- Gatwick Stream flood storage area.

8.5.4 Complete vegetation removal:

- construction compounds;
- CARE facility (Option 2 location);
- noise mitigation feature; and
- River Mole diversion.

8.5.5 Mitigation planting proposals:

- Pentagon Field decked car parking;
- North and South Terminal roundabout and Longbridge roundabout improvements;
- noise mitigation feature;
- relocation of Pond A;
- flood compensation at Museum Field and east of Museum Field;
- replacement parking at Crawter's Field (Purple Parking);
- South Terminal and North Terminal extensions and forecourts;
- CARE facility;
- new hangar;
- Gatwick Stream flood compensation;
- River Mole diversion works; and
- North Terminal Long Stay decked car parking.

8.5.6 No assumptions and limitations have been identified in the preparation of this chapter with regard to landscape, townscape and visual resources that would prevent a preliminary assessment of the potential effects being made for the purposes of this PEIR.

8.6. Baseline Environment

Current Baseline Conditions

Topography

8.6.1 Landform elevation (height) throughout the study area is shown on Figure 8.6.1. The Low Weald landscape extends over much of the study area. The landform is smooth and gently undulating with occasional rounded low hills interrupting an otherwise low-lying landscape. Gatwick Airport lies within this landscape, occupying a relatively level area at about 60 metres above ordnance datum (AOD). Occasional higher hills, such as the Low Weald hills to the west of Gatwick Airport rise to about 120 metres AOD. The large settlement of Crawley lies immediately to the south of Gatwick rising to about 70 metres AOD. Further south east the landform rises again to the High Weald AONB to between 140-160 metres AOD. The landscape of the AONB is visible from the Weald as an escarpment.

8.6.2 The most notable watercourse within the study area is the River Mole which rises to the south west of the airport near Rusper before flowing north to the River Thames. The watercourse is culverted beneath the runway and emerges to flow through a naturalised linear green space on the north western side of Gatwick Airport. Crawter's Brook flows through the southern edge of Gatwick Airport around the fringes of Lowfield Heath before joining the River Mole culvert. Gatwick Stream rises in the Worth Forest in the High Weald AONB and flows through the eastern part of Gatwick Airport, east of the railway via South Terminal to Riverside Garden Park and its confluence with the River Mole. Man's Brook follows the eastern edge of Brockley Wood, linking to the River Mole.

Land Use

8.6.3 Due to the scale and nature of development at Gatwick, the airport forms its own distinctive and well-defined urban townscape (see Figure 1.3.1). Gatwick Airport extends over an area of 850 hectares and occupies the majority of land within the Project site boundary. The remainder of the land within the Project site boundary is formed of smaller areas of farmland and open space beyond the current airport boundary. The majority of the land within the Project site is flat and open, occupied by runways, taxiways, stands, surface car parking and mown grassland. The main built form is located at the North Terminal and South Terminal clusters. Architectural treatments and materials vary throughout the Project site, forming a varied built form typical of an international airport which has evolved and expanded over time. Several large aircraft hangars, a cargo hall, hotels, multi-storey car parks and control towers form other large scale or prominent buildings within the airport. The M23 spur forms the main road transport route into the airport from the east, linking the M23 to the South Terminal and the A23 to the North Terminal and surrounding settlements. The London to Brighton railway passes through the Project site on a north-south alignment, linking to the Gatwick Airport Station. There are earthen bunds in various locations along the western airport perimeter which provide acoustic and visual screening of the airport. They are visible only locally and contrast with the natural landform.

8.6.4 Gatwick Airport, in the vicinity of the terminals and car parks, is a well-lit environment for the practical and safe function of the airport. Lighting columns are located along the A23 surface access roads, internal circulatory roads and within car parks. Light sources are also located within all terminal buildings, hotels, multi-storey car parks, hangars and ancillary buildings and are visible at night through windows and doors. Lighting on aircraft and cars forms moving sources of light within and around the airport.

8.6.5 Due to the large number and scale of passenger aircraft at stands and piers across the airport, aircraft form a significant and distinctive element of the character of Gatwick Airport.

8.6.6 The main areas of green infrastructure are associated with the River Mole to the north west and the land to the east of the railway and south of South Terminal. The broad, naturalised riparian corridor through which the River Mole flows includes the sinuous watercourse, wet meadow terraces and marginal habitats and belts of native tree and shrub planting. A small block of mature, ancient woodland at Brockley Wood lies east of the River Mole. A larger area of green infrastructure lies to the east of the railway. Blocks of mature woodland, some of which is designated as ancient, lie at Horleyland Wood and Upper Pickett's Wood. These are linked by woodland belts, hedgerows and copses to form an extensive network of native trees and shrubs which merge with neighbouring gardens of residential properties. Open areas of grassland are located at the surface water attenuation feature south of the Crawley Sewage Treatment Works and grazing land at Pentagon Field. Mature hedgerows define many of the perimeters of car parks and form remnants of the agricultural landscape. Mature tree, shrub and amenity planting is associated with the North and South Terminals and the A23 surface access network. The green infrastructure throughout the Project site combines to form an attractive and diverse element of the airport.

8.6.7 Land within the Project site boundary that lies outside of Gatwick Airport includes the Riverside Garden Park. This is a public open space which separates Gatwick Airport and the residential edge of Horley. The space comprises informal mature woodland, trees, amenity planting, grassland and lakes. A small area of public open space and grazing land surrounded by mature

hedgerows and trees lies north of the Longbridge roundabout on the A23. Several fields of grazing land surrounded by hedgerows and trees lie to the west between the River Mole and Gatwick Aviation Museum. Two separate areas comprising several fields of grazing land surrounded by hedgerows and trees lie to the north of the A23 and to the south of the M23.

8.6.8 Apart from the woodlands and parts of the River Mole corridor, the character of the Project site is intensely urban, particularly within and around the development clusters at the terminals.

Public Rights of Way

8.6.9 Several public rights of way are located within the Project site (see Figure 8.4.3). Public footpath 346 forms the longest route linking the North and South Terminals via Perimeter Road and continuing along the A23 to the River Mole crossing. The route continues south along the river and joins the Horley Road at the Bear and Bunny Nursery. A small section of footpath 347 links footpath 346 to Horley Road via woodland planting. Footpath 355 lies parallel to the eastern side of the railway line south of the A23. This footpath links with footpaths 360, 361 and 359 which lie adjacent to hedgerows and trees surrounding car parks and passes through Upper Picketts Wood and between residential properties to connect to Radford Road. Other footpaths associated with this area of green infrastructure east of the railway line, including 360 and 358, pass through woodlands and between attenuation ponds. Footpath 359 extends north to follow the western and northern edge of grazed land at Pentagon Field. Footpath 367 passes through the proposed construction compound site south of the M23 linking Balcombe Road and Fernhill Road. Footpath 574 passes between the cemetery and Longbridge roundabout west of Horley.

8.6.10 The Sussex Border Path long distance route coincides with many of these definitive rights of way to form a continuous route linking Charlwood in the west to the M23 in the east via the airport.

8.6.11 National Cycle Route 21 passes through Horley and the Riverside Garden Park, beneath the A23 and the Inter-Terminal Transit System (ITTS) and continues south between the A23 and railway to Crawley.

Landscape Designations

8.6.12 Gatwick Airport is located outside of any designated AONB or National Park. There are three AONBs and a National Park within the wider study area (see Figure 8.4.2) comprising:

- High Weald AONB;
- Surrey Hills AONB;
- Kent Downs AONB; and
- South Downs National Park.

8.6.13 The landscapes within these designated areas are relevant to the assessment of the influence of overflying aircraft on the perception of tranquillity.

8.6.14 The primary purpose of the AONB designation is to conserve and enhance natural beauty, maintain a thriving community life and promote understanding of the area's special qualities.

High Weald Area of Outstanding Natural Beauty Management Plan 2019 to 2024

8.6.15 The High Weald AONB extends over a broad swathe of south east England from Horsham in the west to Rye in the east. The AONB is located approximately 3 km to the south east of the Project

site, separated from the airport by the town of Crawley. The designation extends over a large part of the study area between approximately 5 km and 15 km to the south and east of the airport.

8.6.16 The High Weald Joint Advisory Committee make the following commitments within the High Weald Area of Outstanding Natural Beauty Management Plan 2019 – 2024 (High Weald Joint Advisory Committee, 2019):

- *'Use the plan to assess whether activities in the 'setting' of the High Weald affect land in the AONB'.*
- *'Use the plan to identify effects of proposed development on the AONB helping ensure development is 'landscape-led' and contributes to conserving and enhancing natural beauty'*.

8.6.17 The Management Plans Statement of Significance identifies the five defining components of the High Weald which comprise its special qualities, which are as follows.

- *'Geology, landform and water systems: a deeply incised, ridged and faulted landform of clays and sandstone with numerous gill streams.*
- *Settlement: dispersed historic settlements including high densities of isolated farmsteads and late medieval villages founded on trade and non-agricultural rural industries.*
- *Routeways: a dense network of historic routeways (now roads, tracks and paths).*
- *Woodland: abundance of ancient woodland, highly connected and in small holdings.*
- *Field and Heath: small, irregular and productive fields, bounded by hedgerows and woods, and typically used for livestock grazing; with distinctive zones of lowland heaths, and inned river valleys'*.

8.6.18 The Management Plan also defines 'Other Qualities' as follows:

'These include locally distinctive features which enrich the character components such as historic parks and gardens, orchards, hop gardens, veteran trees along with the rich and varied biodiversity and a wide range of appealing and locally distinctive historic buildings including oast houses, farm buildings, Wealden Hall houses and their associated features such as clay-tile cat slide roofs. People value the wonderful views and scenic beauty of the High Weald with its relative tranquillity. They appreciate the area's ancientness and sense of history, its intrinsically dark landscape with the opportunity to see our galaxy – the Milky Way – and the ability to get close to nature through the myriad public rights of way'.

8.6.19 A key issue defined for 'Other Qualities' which is relevant to the assessment is as follows:

- *'Development including traffic, noise and light pollution, degrading the AONB's tranquil and dark qualities'*.

8.6.20 The Objective identified is OQ4:

- *'To protect and promote the perceptual qualities that people value'*.

8.6.21 The rationale is;

- *'To ensure that the special qualities people value, such as tranquillity, dark skies, sense of naturalness and clean air, are recognised and taken account of in AONB management'*.

8.6.22 Areas of landscape within the High Weald AONB that lie closer to Gatwick Airport and the large settlement of Crawley are influenced by a combination of the expanse of development, the concentration of people, the movement of traffic and overflying aircraft, the light generated by these and the noise from aircraft. A combination of these elements influences the level of perceived tranquillity. This area of landscape coincides, to a limited extent, with the ZTV for the Project within a 5 km radius and forms part of the wider study area for overflying aircraft less than 7,000 feet above ground level.

Surrey Hills Area of Outstanding Natural Beauty Management 2020 to 2025

8.6.23 The Surrey Hills AONB extends over an area of upland landscape which links to the South Downs National Park to the west and the Kent Downs AONB to the east. Parts of the AONB at Dorking, Reigate and Redhill are located within the wider study area for overflying aircraft.

8.6.24 The Surrey Hills Area of Outstanding Natural Beauty Management Plan 2020 to 2025 (Surrey Hills AONB Board, 2020) includes a section 'Defining the natural beauty of the Surrey Hills AONB'. The key characteristics are as follows:

'Although the Surrey Hills is now one of the most wooded of the nationally protected areas in the country, it is still an intriguingly diverse landscape characterised by hills and valleys, traditional mixed farming, a patchwork of chalk grassland and heathland, sunken lanes, picturesque villages and market towns. It has associations with many of the country's great artists, writers, musicians and designers. It is often regarded as the first real countryside south of London and is a rural retreat for many thousands of daily commuters'.

'The Hills stretch across the chalk North Downs that run from Farnham in the west, above Guildford, Dorking and Reigate, to Oxted in the east. They contain a mosaic of woodland, scrub and open downland with combes, spring lines, chalk pits, quarries and striking cliffs. To the south are the Greensand Hills that include Black Down, the Devil's Punch Bowl and Leith Hill, with ancient sunken lanes and geometric fields that have been enclosed from heaths and wooded commons. In between are the valleys of the Wey, Tillingbourne and Mole rivers, and heaths of Frensham, Thursley and Blackheath. The Low Weald forms the southern fringe of the Area of Outstanding Beauty, with its extensive woodlands and small irregular fields, hedgerows and wooded shaws'.

'Although geology, soils and climate have created the bones of the landscape, the appearance of the Surrey Hills has been shaped for centuries by the changing patterns of land use and settlement. Over much of the Surrey Hills the historic settlement pattern remains largely intact: small picturesque villages of Saxon and medieval origin in the valleys; isolated farmsteads on chalk slopes, valley bottoms and in clearings won from the woodland; large country houses with designed landscapes including parklands; market towns; and remnants of seventeenth and eighteenth century industry'.

8.6.25 The 11 features, listed in order, that define the special character of the Surrey Hills, based on consultation feedback during the preparation of the Management Plan are as follows:

- views;
- woodland;
- heathland;
- tranquillity;

- commons;
- downland;
- country lanes;
- farmland;
- dark skies
- historic buildings; and
- parkland.

Kent Downs Area of Outstanding Natural Beauty Management Plan 2014 to 2019

8.6.26 The Kent Downs AONB extends over a band of landscape associated with the M25 and M20 around Sevenoaks and east to Rochester.

8.6.27 Special qualities are defined in the Kent Downs Area of Outstanding Natural Beauty Management Plan 2014 – 2019 (Kent Downs AONB Unit, 2014) and the emerging Kent Downs Area of Outstanding Natural Beauty Management Plan 2020 – 2025 as follows.

- Dramatic landform and views – Impressive south facing steep scarp slopes of chalk, hidden dry valleys, open plateaux, river valleys and iconic chalk cliffs. 'Breathtaking', long-distance panoramas.
- Biodiversity rich habitats – Rich mosaic of semi-natural chalk grassland, ancient semi-natural woodland, traditional orchards, chalk cliffs and sea platform, chalk rivers, wet pasture, spring lines, heath and acid grassland.
- Farmed landscape – Mixed farming including pasture, orchards, hop gardens, arable crops and horticulture.
- Woodland and trees – Deciduous and mixed woodland on the upper scarp slopes, dry valleys and plateaux tops. Over half the woodland is ancient and includes extensive coppiced sweet chestnut.
- A rich legacy of historic and cultural heritage – Distinctive architecture of villages, farmsteads, oasthouses, barns, churches and country houses using a range of materials including flint, chalk, Ragstone, timber and tile. Ancient network of fields, hedges, droveways and sunken lanes.
- Geology and natural resources – Imposing landform of the Kent Downs. Soils and geology are important for agriculture, biodiversity and water resources. Fresh air experienced throughout the AONB.
- Tranquillity and remoteness – Surprisingly tranquil and remote countryside offering dark night skies and peace.

8.6.28 A recurrent theme in the Kent Downs AONB is that of tranquillity and remoteness. The Management Plan states that:

'The perception of being away from the noise, sights and smells of modern life is a much valued feature of many parts of the AONB where people can refresh body and soul. National tranquillity mapping carried out by the CPRE has confirmed that the Kent Downs offers important areas of relative tranquillity'. The Management Plan also identifies that *'Several main flight paths from London to mainland Europe pass over the Kent Downs, and the western part of the landscape is passed by aircraft descending to London Gatwick. The impact of overflying airplanes on landscape tranquillity can be significant'.*

South Downs National Park

8.6.29 The South Downs National Park Authority adopted the South Downs Local Plan 2014 to 2033 in July 2019.

8.6.30 The National Parks' statutory purposes and duty is *'To conserve and enhance the natural beauty, wildlife and cultural heritage of the area'* and *'To promote opportunities for the understanding and enjoyment of the special qualities of the National Park by the public'*.

8.6.31 The Local Plan defines seven special qualities as follows:

- diverse, inspirational landscapes and breathtaking views;
- distinctive towns and villages, and communities with real pride in their area;
- well-conserved historical features and a rich cultural heritage;
- great opportunities for recreational activities and learning experiences;
- tranquil and unspoilt places;
- a rich variety of wildlife and habitats including rare and internationally important species; and
- an environment shaped by centuries of farming and embracing new enterprise.

8.6.32 The study area for the assessment of effects on tranquillity within the National Park coincides predominantly with the Western Weald character area and also smaller parts of the Greensand Hills, Sandy Arable Farmland and Major River Floodplains (River Arun) character areas which collectively lie within the Low Weald landscape character type (LCT). The Western Weald is described as *'made up of wooded hills, deep valleys and open heaths linked by sandy sunken lanes. It includes Black Down, which is the highest point in the National Park'*. Whilst the Local Plan includes strategic policies regarding safeguarding views, relative tranquillity and dark night skies (the entire National Park is defined as an International Dark Sky Reserve) these are concerned with development within the National Park and do not refer to the existing or proposed effects of overflying aircraft.

South Downs National Park Authority Tranquillity Study 2017

8.6.33 This study (South Downs National Park Authority, 2017) was undertaken to provide an evidence base to inform local planning policy and help the South Downs National Park Authority to protect and enhance areas of high tranquillity within the National Park.

8.6.34 Within this report, tranquillity is defined as:

'Tranquillity is considered to be a state of calm, quietude and is associated with a feeling of peace. It relates to quality of life, and there are good scientific evidence that it also helps to promote health and well-being. It is a perceptual quality of the landscape, and is influenced by things that people can both see and hear in the landscape around them'.

8.6.35 The tranquillity mapping exercise undertaken for the study identified the relative tranquillity of the landscape of the South Downs National Park and does not form a comparison with other areas of the country. The study identifies both visible and audible factors and both positive and negative factors and divides the National Park into three categories:

- *'Areas of highest tranquillity – should demonstrate that they conserve and enhance factors that contribute to relative tranquillity.*

- *Areas of intermediate tranquillity – are often those areas most vulnerable to change, should avoid further harm and take every opportunity to enhance it.*
- *Areas of lowest tranquillity – are often within or on the edge of urban areas, may have limited scope for enhancing tranquillity but opportunities for enhancement should be taken wherever possible'*.

8.6.36 Appendix 2 of the study includes tranquillity factors assessed within the South Downs National Park. These include negative factors defined within the study as '*seeing*', relating to overflying aircraft, as follows:

- *'low flying aircraft – aircraft are visible flying at low altitudes (estimated up to 7,000 feet)*;
- *high altitude aircraft – aircraft are visible at altitudes (estimated 7,000 feet or more)*;
- *low flying aircraft – clear audible noise from low flying aircraft can be heard'*; and
- *'high altitude aircraft – noise from high altitude aircraft can be heard at all'* (locations).

8.6.37 The tranquillity scores formed the output from the study, including a combination of the desktop Campaign to Protect Rural England data and the field based South Downs National Park Authority data. Areas of the National Park which are overflown by aircraft at up to 7,000 feet above ground level include land defined by the South Downs National Park Authority as low, intermediate and high tranquillity. Low tranquillity areas are associated with development within and around settlements and transport corridors. High tranquillity areas are rural and located away from settlements and transport corridors. Areas of intermediate tranquillity are located outside of settlements and transport corridors but are not in completely rural areas. The author considers that the data within the South Downs National Park Authority Tranquillity Study 2017 indicate that the presence of overflying aircraft does not have a defining effect on the levels of tranquillity experienced within the National Park.

Landscape Character

National Character Areas

8.6.38 Gatwick Airport and its immediate landscape context are located within the Low Weald National Character Area 121, as defined in Natural England's National Character Area (NCA) profiles which divide England into 159 Joint Character Areas (see Figure 8.4.2). Other character areas within the wider study area include High Weald NCA 122, Wealden Greensand NCA 120 and North Downs NCA 119. The national character areas provide a broad character context for the analysis of the baseline conditions and help to provide a common link between the baselines of the large scale of the wider study area for the assessment of tranquillity and the much smaller 5 km radius study area for the assessment of effects at the airport. The key characteristics of these areas are described below.

Low Weald

8.6.39 The Low Weald forms a broad arc of landscape south of London which wraps around the High Weald and extends to the coastline at the Pevensey Levels. Key characteristics include the following.

- Broad, low-lying, gently undulating clay vales with outcrops of limestone or sandstone providing local variation.

- The underlying geology has provided materials for industries including iron working, brick and glass making, leaving pits, lime kilns and quarries. Many of the resulting exposures are critical to our understanding of the Wealden environment.
- A generally pastoral landscape with arable farming associated with lighter soils on higher ground. Land use is predominantly agricultural but with urban influences, particularly around Gatwick, Horley and Crawley.
- Field boundaries of hedgerows and shaws (remnant strips of cleared woodland) enclosing small, irregular fields and linking into small and scattered linear settlements along roadsides or centred on greens or commons. Rural lanes and tracks with wide grass verges and ditches.
- Small towns and villages are scattered among areas of woodland, permanent grassland and hedgerows on the heavy clay soils where larger 20th-century villages have grown around major transport routes.
- Frequent north–south routeways and lanes, many originating as drove roads, along which livestock were moved to downland grazing or to forests to feed on acorns.
- Small areas of heathland particularly associated with commons. Also, significant historic houses often in parkland or other designed landscapes.
- The Low Weald boasts an intricate mix of woodlands, much of it ancient, including extensive broadleaved oak over hazel and hornbeam coppice, shaws, small field copses and tree groups, and lines of riparian trees along watercourses. Veteran trees are a feature of hedgerows and in fields.
- Many small rivers, streams and watercourses with associated watermeadows and wet woodland.
- Abundance of ponds.
- Traditional rural vernacular of local brick, weatherboard and tile-hung buildings plus local use of distinctive Horsham slabs as a roofing material. Weatherboard barns are a feature.

High Weald

8.6.40 The High Weald NCA 122 coincides predominantly with the upland areas of the High Weald AONB which is described in detail at paragraphs 8.6.15 to 8.6.19 and is therefore not repeated here.

Wealden Greensand

8.6.41 The Wealden Greensand NCA 120 is a linear landscape that forms a transition between the Low Weald to the south and the North Downs to the north. Key characteristics include the following.

- A long narrow, undulating landform of scarp and dip slopes including Leith Hill, one of the highest points in south east England.
- Extensive areas of ancient mixed woodland.
- Remnants of lowland heathland, unimproved acid grasslands and pasture.
- Small to medium sized irregular fields bounded by hedgerows and shaw woodland.
- Agricultural land is mixed and includes orchards in Kent.
- Settlement pattern includes dispersed farmsteads, hamlets and nucleated villages. Large houses set in parkland occur throughout the area.
- The local built vernacular includes stone, timber framing and weatherboarding.
- Historic landscape features include sunken lanes cut into the sandstone and older deer parks.
- Many streams and rivers cut through the area.

North Downs

8.6.42 The North Downs NCA 119 is a linear upland landscape north of the Wealden Greensand extending from Surrey in the west to the White Cliffs of Dover in the east. Key characteristics include the following.

- A distinctive chalk downland ridge with a steep scarp slope to the south bisected by dry valleys, deep river valleys, ridges and plateaux.
- A series of dry coombes cut into the scarp slope create an undulating topography.
- The footslope of the escarpment supports arable farmland and horticulture on richer loamy soils.
- Woodland is located on steep slopes and valley sides. Hedgerows and shaws surround fields creating a wooded character.
- Chalk grassland and heaths have rich biodiversity.
- Historic landscape features include sunken lanes cut into the dip slope, defensive installations and houses set in parkland estates.
- Settlement pattern includes scattered farmsteads and nucleated villages and oast barns. Flint, chalk and Wealden brick form vernacular materials.
- The highly developed outskirts of London fringe and influence the northern boundary of the area.

8.6.43 The National Character Area profile also defines an aspiration to *'protect the tranquillity of the landscape'….'an often remote and tranquil atmosphere offering dark night skies in places'*.

County Level Landscape Character Assessment

8.6.44 County wide landscape character assessments have been prepared by West Sussex and Surrey County Councils, which coincide with the 5 km radius study area. However, as more detailed landscape and townscape character assessments have been prepared by the six district authorities within the 5 km radius study area and as many of the character areas are duplicated at county and district level, to avoid repetition only the district assessments have formed the basis for the assessment. For completeness and to provide further context to the assessment in this chapter, relevant extracts from the West Sussex County Council Landscape Character Assessment (2007) and the Surrey County Council Landscape Character Assessment (2015) can be found in Appendix 8.6.1.

District Level Landscape and Townscape Character Assessments

8.6.45 This section refers to assessments published by local authorities and includes key features, elements and characteristics, intrinsic sensitivity, value and condition. Landscape and townscape value within the study area is expanded upon in paragraphs 8.6.77 to 8.6.95.

Crawley District

8.6.46 The landscape between Crawley and Gatwick Airport is identified in the Crawley Borough Council Draft Landscape Character Assessment (Crawley Borough Council, 2012) as being within 'Area 1- Upper Mole Farmlands' (see Figure 8.6.2).

Crawley: Upper Mole Farmlands

8.6.47 Its key characteristics are described as follows.

- Rural landscape strongly influenced by proximity of Crawley to south and Gatwick Airport to north.
- Variable field pattern and land use divided by hedgerows with small farm ponds.
- Mixed land use ranging from industrial units and hotels/motels along the A2219, pastoral and arable across the wider area with a concentration of playing fields to the south and a caravan park to the north.
- Flat to very gently undulating landscape, crossed by the upper tributaries of the River Mole.
- Generally confined views with the exception of localised high point at Rowley Farm.
- Small blocks of woodlands and copses.
- Noise and visual intrusion due to proximity to Gatwick Airport.

8.6.48 The study states that, overall, the area has a moderate sensitivity to change. Thick hedgerows, hedgerow trees and occasional woodlands to some extent reduce its visual sensitivity. Despite some noise intrusion from Gatwick much of the area is tranquil. The study considers that the landscape condition is declining due to increasing visual/noise intrusion in some parts.

8.6.49 A key issue is defined as *'the potential for the expansion of Gatwick Airport'*.

8.6.50 An objective within the study is that *'This area plays an important role in separating Crawley from Gatwick allowing greater access to the countryside for residents who live in the neighbourhoods at the north of the borough.'*

8.6.51 The area to the east of the London to Brighton railway line is shown within Area 6 North East Crawley High Woodland Fringes (see Figure 8.6.2).

North East Crawley High Woodland Fringes

8.6.52 Its key characteristics are described as follows.

- Flat to gently undulating narrow clay vale, with floodplain and upper tributaries of the River Mole in the north east.
- Pattern of small, medium and large fields with a variable density of hedgerows.
- Predominantly pasture farmland.
- Scattered tree cover, isolated woodlands and copses.
- Distinctive field trees and farm ponds.
- Major road and rail corridors and pylon lines.
- Strong suburban and urban fringe influences of Crawley and Gatwick Airport.

8.6.53 The study states that in terms of landscape character/visual sensitivity the area has a moderate sensitivity to change. Thick hedgerows, hedgerow trees and occasional woodlands to some extent reduce its visual sensitivity. The study states that the landscape condition *'is considered to be declining due to increasing visual/noise intrusion in some parts'*.

8.6.54 Key issues are defined as *'Visual and noise impact of Gatwick Airport and M23'* and *'Localised visual impact of urban fringe uses, including development of airport car parks'*.

8.6.55 An objective within the study is that *'This area is of high landscape value which should be retained for public access benefits and maintaining the separate identities of Gatwick Airport, Crawley and Horley'*.

Mole Valley District

8.6.56 The landscape north west of Gatwick Airport is identified in the Mole Valley Landscape Supplementary Planning Document (SPD) (2013a) as being within the 'Open Weald' character area.

Mole Valley: Open Weald

8.6.57 Its key characteristics are described as follows.

- Moderately open, small scale, undulating landscape.
- Small, irregularly shaped fields are divided by strong pattern of square cut hedges with regularly spaced hedgerow oaks.
- Narrow winding lanes are enclosed by low hedges or are sunken with hedge banks.
- River/streams are sunken below the surrounding land and only apparent as a result of occasional riparian alder and willow.
- Small scattered development occurs on higher ground, larger scale modern development lies on the flat plain around Gatwick.
- Church towers and farm buildings provide important focal points in short distance views.
- On-going threat of airport-related development encroaching into the rural landscape.

8.6.58 The SPD recommends the following action;

'Conservation through appropriate management of characteristic hedges, shaws, hedgerow trees and field trees.'

Reigate and Banstead District

8.6.59 The landscape north east of Gatwick Airport is identified in the Reigate and Banstead Borough Wide Landscape and Townscape Character Assessment (June 2008) as being within the 'Low Weald' character sub-area C1.

Low Weald

8.6.60 Its key characteristics are described as follows.

- The landscape has a gently changing topography forming low, raised areas and very shallow valleys. Expansive views are possible.
- A unified landscape which exhibits similar characteristics across its extents, with some variety of character where it meets urban areas.
- There are localised small blocks of woodland, some of which are designated as ancient woodland.
- The area to the east of Horley is the only part of the Borough's countryside not designated as Green Belt.
- South of Horley the landscape is interrupted and severed by human activities, transport infrastructure and development mainly due to the proximity to Gatwick Airport, rail lines and major roads. There are associated noise and visual impacts on open spaces which result in a low sensitivity to change. Green areas are frequently associated with 'horsiculture'.

8.6.61 The assessment considers the overall landscape sensitivity to be medium-high. However, the areas in close proximity to Gatwick Airport are considered to be of low sensitivity.

Townscape Character

8.6.62 The local settlements of Crawley, Horley, Charlwood and Hookwood have been identified as townscape character areas in this assessment.

Crawley District

8.6.63 A baseline character assessment of Crawley was completed in May 2009 on behalf of Crawley Borough Council (2009). The Crawley Borough Council (2009) Crawley Baseline Character Assessment identified, *'eight strategic character areas based on urban and landscape character, predominant land use and development age'.* Each of these character types also contain a number of character areas and sub-character areas (see Figure 8.6.2).

8.6.64 Crawley was designated as the site for a New Town in 1947 in order to take the overspill population from London after the second world war. Originally the town was laid out with nine neighbourhoods ringing an expanded town centre. The area of Crawley that is most relevant within this assessment due to some degree of intervisibility with Gatwick Airport is Northgate/Manor Royal which lies on the northern fringe of the town adjacent to the Upper Mole Farmlands and High Woodland Fringes referred to above.

Manor Royal (Northgate)

8.6.65 The large commercial/business area of Manor Royal lies to the west of the A23 and is within the 'Employment Areas' strategic character area. It is not covered in detail within the study albeit the following description is provided:

'The main roads (Fleming Way and Manor Royal) through the area are wide with large grassed verges and street trees and serve large development plots which have been developed on a plot-by-plot basis. Building typologies are either single or double height, brick, steel or glass with large floor plates, shallow pitched or flat roofs and a variety of sizes and styles. There are a number of office blocks / reception areas of three –six storey constructed of red or buff brick or clad'.

8.6.66 The Crawley Borough Council assessment defines the townscape quality of Manor Royal as ordinary. The urban townscape is typical and commonplace. The area has been progressively developed/redeveloped in a piecemeal way and lacks a distinct identity. The Crawley Borough Council assessment defines the townscape value as low.

8.6.67 With respect to views from the northern edge of Crawley to the West Sussex county landscape character area known as Northern Vales (LW8), the study states the following:

'Within the northern urban area views are generally restricted to local and short distance, due to the contained nature of the built form, screening provided by belts of trees, hedgerow vegetation and the generally low-lying flat topography. Along the northern fringes to the north and north-west (Ifield, Langley Green and Lowland Heath) views are limited to short distances over the rural fringe landscape. The contained nature of the urban area breaks up, allowing views over the intimate rural landscape with fields of pasture delineated by mature hedgerows and trees. In some places these views are filtered due to the break up in density of the hedgerows and tree cover; in others slightly more extensive views are possible due to larger field layouts, created by the intensification of modern farming. The presence of Gatwick Airport is also clearly evident in these fringe areas. Although the airport is not directly visible from the edge of the built-up area, aircraft continually puncture the skyline as they take-off. This land use also impacts on the rural

character of the northern pastoral plain as the large units and warehouses (many associated with airport services) in Manor Royal and Lowfield Heath provide an industrial character to the landscape'.

Horley

8.6.68 The townscape of Horley is described in the 'Borough Wide Landscape and Townscape Character Assessment', undertaken by Atkins on behalf of Reigate and Banstead Borough Council (2008) as follows:

'Mostly 1930's-1950's suburbia, arranged on straight, uniform road layout; A Victorian-Edwardian core to the town centre, including a conservation area, and localised surviving pre-Victorian development; and more recent suburban development around the edge of town, ranging from 1960's to recent development.'

8.6.69 That part of the settlement nearest to the airport is suburban in character and also includes the Riverside Garden Park beside the A23. This area once formed part of Horley Common; an area of semi-natural woodland and open grassland. The public open space at Riverside Garden Park forms a relatively attractive and well-used community asset within the townscape character area.

8.6.70 The Reigate and Banstead Borough Council assessment defines the range of townscape quality of Horley from good to ordinary. The settlement is mainly suburban in character with a Victorian/Edwardian town centre and two conservation areas. The Reigate and Banstead assessment defines the overall townscape value as medium.

Charlwood

8.6.71 The character of Charlwood is described in the Mole Valley Local Development Framework-Larger Rural Villages Character Appraisal Supplementary Planning Document (SPD) (Mole Valley District Council, 2013b). This identifies three separate areas of character within the settlement; the 'Village Core', 'Rectory Lane' and 'East Charlwood'. That part of the 'Village Core' which extends east along Horley Road is the nearest to Gatwick Airport. The main characteristics of the settlement of relevance to this study include the following:

'The village as a whole has a loose knit, sinuous form, spreading out from its core near the Parish Church and the junction of Ifield Road and The Street. Pockets of built development are interspersed with expanses of open space, notably the Recreation Ground and The Millennium Field, which bring fingers of countryside right into the heart of the settlement. These open spaces are an integral part of the character of the village.'

8.6.72 The study also notes that whilst Charlwood is near to the Crawley urban area and closer to Gatwick Airport, it still retains the '*feel of a small rural settlement'*. It also notes the importance of the fields between the settlement and the airport as '*preventing the village coalescing with the airport'* and the value of the existing noise attenuation bunds along this boundary of the airport which it states '*protect the village both visually and acoustically'*. It continues, '*although there are some clear views of the airport from high points outside the village (eg Norwood Hill), the landscaping ensures that it is hardly seen from closer quarters*.'

8.6.73 The SPD defines the townscape quality of Charlwood as high. This is an attractive townscape with a strong, intact rural village character. The SPD defines the townscape value as high.

Hookwood

8.6.74 Hookwood is described in the same SPD as Charlwood above. Two character areas are defined, 'East Hookwood' (essentially commercial) and 'West and South Hookwood' (essentially residential). The key characteristics of the latter area include the following:

'Buildings chiefly strung out along two main roads, with a small amount of backland development, mainly within the centre of the village; Concentration of original Edwardian cottages on east side of Reigate Road indicating the original heart of the village, now rather dominated by the larger scale urban areas to the south and east. Lack of clear identity to the village centre; Sporadic green landscaping, including some generous hedge and tree cover in individual properties'.

8.6.75 The SPD defines the townscape quality of Hookwood as ordinary. This is a typical and commonplace townscape with some features worthy of conservation, including Edwardian cottages on the east side of Reigate Road within the original heart of the village. The SPD defines the townscape value as medium.

Gatwick Airport Urban Character Area

8.6.76 Following review of the landscape and townscape character assessments prepared by Crawley Borough Council, within which the airport lies, it was considered the distinct character of Gatwick Airport had not been adequately described. The airport extends over an area of 850 hectares within the Low Weald of Crawley district and West Sussex county. Therefore, a further urban character area has been identified and forms the basis for the assessment of effects within the Project. The character description and baseline for the purposes of this assessment have been based on the description of the airport in paragraphs 8.6.1 to 8.6.11 of this chapter. The airport is considered to have an ordinary condition and generally a low sensitivity to change as a result of the Project.

Landscape and Townscape Value

8.6.77 As part of the baseline description of the study area the value of the landscape or townscape that would be affected has been established. The NPPF at paragraph 170 states that *'Planning policies and decisions should contribute to and enhance the natural and local environment by: protecting and enhancing valued landscapes…. (in a manner commensurate with their statutory status or identified quality in the development plan).*

8.6.78 GLVIA3 defines value as *'the relative value that is attached to different landscapes by society, bearing in mind that a landscape may be valued by different stakeholders for a whole variety of reasons. A review of existing landscape designations is usually the starting point to understanding landscape value, but the value attached to undesignated landscapes also needs to be carefully considered and individual elements of the landscape and individual elements of the landscape may also have value'*.

8.6.79 GLVIA3 includes a list of eight factors within Box 5.1 that have been used to identify landscape/townscape value. These have been used as factors in the following sections of this chapter to establish value within the study area:

- landscape quality;
- scenic quality;
- rarity;

- representativeness;
- conservation interest;
- recreation value;
- perceptual aspects; and
- associations.

Landscape Quality

8.6.80 Landscape quality, or condition, measures the physical state of the landscape. It may include the extent to which typical character is represented in individual areas, the intactness of the landscape and the condition of individual elements.

8.6.81 The condition of the landscape and townscape character areas, as defined in the various district character assessments which are relevant to this assessment, is described in the section above. The Gatwick Airport Urban character area generally has an ordinary quality and condition due to the large-scale commercial buildings and infrastructure, extensive areas of hardstanding and regular aircraft movements. The airport has some areas of poor condition where there are detracting features of industrial infrastructure and disused land and some areas of good condition including woodlands and watercourses. The combination of dense urban elements and remnants of rural landscape result in a low landscape/townscape quality value. The wider rural landscapes of the Upper Mole Farmlands, High Woodland Fringes and Open Weald in Mole Valley District have an overall medium value, which reduces to low value in some parts of the study area adjacent to the airport, and the Low Weald in Reigate and Banstead District has a low value within the study area. The townscapes of Crawley and Horley have a poor or ordinary condition and a low to medium value within the study area.

Scenic Quality

8.6.82 This measures the degree to which the landscape appeals to the visual senses. The visual baseline is analysed in more detail above.

8.6.83 The green infrastructure throughout the Project site combines to form an attractive and diverse element within the airport. However, the extent and dominance of large-scale built development and infrastructure within the Gatwick Airport Urban character area results in a poor scenic quality and low value overall. The juxtaposition of the airport and the rural landscape of the Low Weald create contrasting backdrops to the Project site and provide a transition in the local context to landscapes with a medium value. The airport merges almost seamlessly with the adjoining urban townscapes of Crawley and Horley which also have a low value in terms of landscape scenic quality. The rural fringes of the High Weald within the AONB, distant from the Project site, are highly valued.

Rarity

8.6.84 This is concerned with the presence of rare features and elements in the landscape or the presence of a rare character type.

8.6.85 The buildings, infrastructure and activities at Gatwick are typical of an international airport and have a low rarity value. Remnants of woodland, including ancient woodland, are present within the airport and are more typical of the wider study area of the Low Weald and have a medium/high landscape value. The surrounding landscapes of the Upper Mole Farmlands, High

Woodland Fringes and Open Weald are more typical of the rural Low Weald and are of relatively higher value, as rural landscapes in the context of the predominantly urban airport.

Representativeness

8.6.86 This analyses the features or elements within the Project site which are considered particularly important examples, which are worthy of retention.

8.6.87 The linear green space and habitats associated with the River Mole, small blocks of mature woodland at Brockley Wood, Horleyland Wood and Upper Pickett's Wood and woodland belts, hedgerows and copses form an extensive network of natural features around the fringes of the airport. These features are important within the airport, require retention and add positively to the character of the Project site and surrounding landscape and townscapes within the study area.

Conservation Interests

8.6.88 This considers the presence of features of wildlife, earth science or archaeological or historical and cultural interest can add value to a landscape.

8.6.89 There are four areas of ancient woodland within the Project site of which one, at Horleyland Wood, is also a Local Wildlife Site. Several further areas of ancient woodland are located south east of the airport within the High Woodland Fringes character area. Land east of the railway and the north-west zone is managed for long term benefits of biodiversity as part of the Gatwick Greenspace Partnership. A Grade II* listed building at Charlwood Farmhouse is located on the north western side of the airport and two Grade II listed buildings at the Courtyard Marriot Hotel are located on the eastern side of the airport. Due to the close proximity of car parks and airport infrastructure to these buildings, their context is relatively poor. The conservation area located around St Bartholomew's Church in Horley lies on the northern edge of the Project site. Other conservation assets within the surrounding landscapes and townscapes have a limited relationship with Gatwick Airport and the Project site due to their location within urban areas or lack of intervisibility with the airport. Overall, the land within the Project site has a low conservation value.

Recreation Value

8.6.90 Several public rights of way including the Sussex Border Path are located within the airport, mainly associated with the River Mole corridor to the north west and the woodlands east of the railway. The National Cycle Route 21 follows the railway line, passing beneath the A23 and through Riverside Garden Park at Horley. This network of routes is well used by the local community and members of staff at Gatwick Airport. The recreational value of the footpaths that cross the Project site and link with the surrounding landscape and townscape is medium. The public open space at Riverside Garden Park lies within Horley Townscape character area. This forms a relatively attractive and well-used community asset with a medium/high recreational value.

Perceptual Aspects

8.6.91 A landscape may be valued for its perceptual qualities, notably wildness and/or tranquillity.

8.6.92 The range and extent of development and activities at Gatwick Airport including the frequent take-off and landing of aircraft define the urban character of the Project site. Consequently, the Gatwick Airport Urban character area cannot be defined as wild and largely precludes a sense of

tranquillity, even in the areas of mature woodland, resulting in a low value. The surrounding farmed landscape and large settlements of the Low Weald also cannot be defined as wild. The large-scale commercial buildings and infrastructure, extensive hardstanding, carparks, aircraft, lighting and aircraft noise and movements associated with the airport together with the large settlements of Crawley and Horley have an adverse influence over the landscape of the Low Weald and influence the tranquillity of the landscape. The concentration of light sources at the airport create a sky glow effect, which is repeated at Crawley, particularly on the northern edge at Manor Royal, which lies adjacent to Gatwick. This character is in contrast to the dark skies and relative night time tranquillity associated with the High Weald AONB to the south. The visual and noise impacts of Gatwick Airport and its potential expansion and the urban centre of Crawley are referenced within district landscape character assessments as an adverse influence over the surrounding landscape. Much of the Upper Mole Farmlands south of Gatwick are described as tranquil within these assessments however, this should be interpreted as relative tranquillity compared to the large scale developments associated with Gatwick Airport and Crawley rather than absolute tranquillity. In close proximity to Gatwick Airport the rural landscapes of the Low Weald in Reigate and Banstead District, the Open Weald in Mole Valley District, and the Upper Mole Farmlands and High Woodland Fringes in Crawley District have a low value in terms of perceptual aspects. The townscape character areas of Crawley and Horley all have low value due to their urban nature.

Associations

8.6.93 Farmland at Gatwick was cleared to create an aerodrome in the late 1920s and has been used for commercial flights since 1933. The first terminal known as ‘The Beehive’ (Grade II* listed) was built in 1935 as a circular building with surrounding taxiways. The building has been redeveloped and currently stands outside the operational airport within the City Place Gatwick office complex. Historically the Gatwick Racecourse occupied the north east side of the current airport from 1891 to 1940. The locations’ operation as a commercial airport forms the main cultural or historic association with the area. The St Michael and All Angels Church at Lowfield Heath is Grade II* listed and lies just outside the Project site boundary. The building has associations with the Gothic Revival architect William Burgess and is the only remaining building in the former village following the development of Gatwick Airport.

Summary of Landscape Value

8.6.94 The overall value of the Gatwick Airport Urban character area is considered to be low. The extensive built development and infrastructure at Gatwick are typical of an international airport. They are largely dictated by the function of the airport and are not highly valued with regard to any of the eight criteria above. The green infrastructure associated with the River Mole, blocks and belts of mature woodland, hedgerows and trees have a greater value and will be protected and enhanced, where possible, within the Project. This green infrastructure links into the surrounding Low Weald, providing a transition from the urban character of the airport and the largely agricultural character of the landscape and makes a positive contribution to the wider area. One of the most valued aspects of the Project site and surrounding landscapes and townscapes is the recreational opportunity that the public rights of way network and open spaces offer the local community. Therefore, whilst relatively minor elements of the Project site have some attractive or scenic qualities and has some wildlife interest and links to public open space at Riverside Garden Park, these are not considered sufficient to elevate the land within the Project site to a landscape that is highly valued.

8.6.95 The NPPF requires landscapes or townscapes that are not statutorily designated to have attributes of a sufficiently high quality to qualify as 'valued landscapes', to ensure their protection and enhancement. The mosaic of land uses within the Project site do not combine to create highly valued special qualities. The airport's relationship, both physical and visual, with the landscapes and townscapes of the study area in which it is located would be largely retained.

Visual Resources

8.6.96 Site surveys have identified a range of visual receptors within the 5 km radius study area. Receptors can be categorised in the following main groups:

- walkers and equestrians using public rights of way;
- cyclists;
- occupiers of residential properties;
- occupiers of commercial properties;
- occupiers of vehicles and trains;
- visitors to Gatwick Airport; and
- members of staff working at Gatwick Airport.

8.6.97 All main receptor groups with potential views of the Project have been described within this chapter. Seventeen viewpoint locations which are representative of key visual receptor groups have been identified and photography undertaken in summer, winter and at night (winter) to provide a more detailed understanding of publicly available views and potential effects on visual amenity (see Figures 8.4.4 to 8.4.20). The level of perceived tranquillity is also defined for each receptor group and viewpoint location. The viewpoints are described below.

Existing Views

Viewpoint 1: Perimeter Road North and public right of way 346/2Sy, Sussex Border Path

8.6.98 This is an enclosed view looking west towards the North Terminal from public right of way 346/2Sy which follows the roadside pavement on Perimeter Road North within Gatwick Airport. Racecourse Road lies behind the security fencing to the left of the view. The distinctive serpentine form of the concrete acoustic wall frames the left side of the view, visible through an avenue of mature lime trees. The Sofitel Arora Hotel and Premier Inn at the North Terminal form large-scale built forms. A decked car park lies in front of the Sofitel, obscuring the base of the building. Jubilee House and Pier Four form lower level buildings, partly visible through the security fence and trees. The raised deck of the tramway shuttle is visible to the right of the view. Earth shaping and mature tree and shrub planting flow between the complex infrastructure, providing visual integration of the built form. In the summer, when trees are in leaf, the buildings and infrastructure are more heavily filtered and screened and become less visually prominent.

8.6.99 At night, lighting columns provide a well-lit road corridor and light sources within the hotels, Pier Four and decked car park define the size and scale of the built form. Lighting at the North Terminal and in airside locations provides a backdrop of skyglow.

8.6.100 Pedestrians using a pavement beside a busy road within the airport, surrounded by buildings, infrastructure and lighting are influenced by traffic and aircraft noise and perceive a low level of tranquillity.

Viewpoint 2: Short Stay Multi-Storey Car Park 3

8.6.101 This is an open view looking north from the open upper deck of the multi-storey car park at South Terminal. The parallel structures of the tramway shuttle station and line, mainline railway, raised road deck and ground level Coach Road combine to form a wide transport corridor below the level of the viewer. The hotels at North Terminal are visible on the left side of the view. The A23 Airport Way bridge over the railway, and the traffic moving on it, are visible within a gap in the mature roadside vegetation. The toll booths at the short stay car park are visible through trees to the right of the view. The majority of the middle distance of the view comprises dense woodland vegetation associated with the A23 corridor, Gatwick green infrastructure or Riverside Garden Park, which screens Horley. The tops of lighting columns are visible rising above this. The distant horizon is formed by the ridge of higher land within the Surrey Hills AONB. In the summer, when trees are in leaf, the buildings and infrastructure at Gatwick Airport are more heavily filtered and screened and become less visually prominent.

8.6.102 At night, lighting columns illuminate the transport corridors. Light sources within trains, the shuttle, the station and hotels are prominent. The distant rural backdrop is largely dark.

8.6.103 Visitors to the airport using the upper deck of a multi-storey car park surrounded by buildings, infrastructure and lighting and influenced by traffic, train and aircraft noise also gain distant views of a rural landscape; however, overall receptors perceive a low level of tranquillity.

Viewpoint 3: Car Rental South Terminal, public right of way 360/Sy

8.6.104 This is a framed view looking north from the public right of way as it crosses an access road at the car rental site of the cluster of buildings and structures at South Terminal. Hedgerows and trees surround the car park in front of the low-rise car rental buildings beyond. A row of hornbeam trees east of the car park partially screens and softens the raised deck of the Upper Forecourt road. The large blocks of the Blue and Red short stay multi-storey car parks rise up behind. Moving traffic at different levels adds to the dynamic character of the view.

8.6.105 At night, lighting columns illuminate the car park, transport corridors and multi-storey car park. Light sources from cars and buses and within buildings are prominent.

8.6.106 Walkers using the public right of way are surrounded by large buildings, car parks, railway line, moving traffic and lighting. Walkers are influenced by traffic and aircraft noise and perceive a low level of tranquillity.

Viewpoint 4: River Mole public right of way 346, Sussex Border Path

8.6.107 This is a channelled view looking north east from the public right of way 346/1Sy beside the narrow channel of the River Mole at Povey Cross. Woodland frames the view to the left and a woodland strip on an earth mound screens views into the airport to the right. The upper parts of the Travelodge Hotel on the A23 are visible rising up above a narrow belt of mixed deciduous and coniferous woodland. In the summer when vegetation is in leaf, built development is almost completely screened.

8.6.108 At night, the light sources at the hotel are prominent in the relatively dark context. Skyglow created by lighting within the airport is visible through the trees to the right.

8.6.109 Walkers using the public right of way experience a narrow green corridor close to development at the airport and Povey Cross and associated noise sources and therefore perceive a low level of tranquillity.

Viewpoint 5: River Mole public right of way 346, Sussex Border Path

8.6.110 This is a channelled view looking south west from public right of way 346/1Sy beside the River Mole, south of houses at Povey Cross Road. Narrow belts of woodland planting on higher land to the right and a steep earth bund to the left frame the view. Scrubby Goat Willow and patches of reed follow the river channel. In summer the foliage provides a dense screen around the viewer.

8.6.111 At night, lighting columns on Perimeter Road North are partly visible through trees in winter and some skyglow is visible generated by Gatwick Airport.

8.6.112 Walkers using the public right of way experience a narrow green corridor close to development at the airport and Povey Cross and associated noise sources and therefore perceive a low level of tranquillity.

Viewpoint 6: Riverside Garden Park, National Cycle Route 21

8.6.113 This is an enclosed view looking south west towards the A23 from the main footpath and National Cycle Route 21 through the park. The large pond forms an open foreground to the view, surrounded by predominantly native trees and shrub planting. A double row of hedgerow and tree planting either side of a public right of way beside the A23 forms a backdrop to the view. The tops of lighting columns, road signs and traffic are visible rising above the vegetation. The route through the public open space is well used. In summer, the vegetation screens most views of the A23 corridor, creating a more secluded space, although traffic noise is still apparent.

8.6.114 At night lighting columns within the park and along the A23 create a partly lit environment. Skyglow created by light sources at Gatwick Airport illuminates the backdrop.

8.6.115 Cyclists using the cycleway experience a green space in close proximity to views of the A23 corridor and noise from traffic and aircraft. Within the context of Horley and the airport the space has a medium perception of tranquillity; however, in terms of absolute tranquillity a receptor's perception is of low levels.

Viewpoint 7: Horley Riverside

8.6.116 This is a restricted view looking south west from the residential edge of Horley beside Riverside Garden Park. An area of disused hardstanding and low grass bund define the foreground. Mature native planting beside the Gatwick Stream and within the park create many layers of vegetation around open grassy areas. Glimpses of moving traffic on the A23 are barely discernible. In summer the foliage creates a dense screen, obscuring views beyond.

8.6.117 At night, lighting columns within the park and along the A23 is visible, filtered through vegetation, in winter only.

8.6.118 Receptors within properties on the edge of the settlement look from an urban environment into an urban green space with a main transport corridor beyond and overhead aircraft noise. Receptors perceive a low level of tranquillity.

Viewpoint 8: Public right of way 362a north of the A23 and South Terminal

8.6.119 This is an open view (approximately 48 metres to Project site boundary) looking south across a grazed horse paddock from public right of way 362a which links residential areas of Horley. The A23 crosses the view on embankment in the middle distance. Woodland planting on the slopes partly screen views of the moving traffic and buildings and infrastructure at Gatwick Airport beyond. Large buildings at the South Terminal are prominent beyond the railway overbridge to the right of the view. The South Terminal Welcome Arch is visible to the left of the view. Lighting columns and road signs are partly visible rising above highways planting. In summer when vegetation is in leaf, most infrastructure is screened, except the top of the South Terminal buildings and the entrance sign and a brief glimpse of the road traffic as it crosses the bridge over the railway.

8.6.120 At night, the concentration of lighting associated with the South Terminal buildings and the Gatwick Airport entrance gantry sign at the Airport Way roundabout are conspicuous beyond a dark foreground. The row of lighting columns along the A23 and the traffic travelling along it are also visible. General lighting within the airport creates a skyglow effect on the right side of the view.

8.6.121 Walkers passing through this urban fringe landscape gain views of development at the airport and the traffic on the A23. Noise from the road, railway and overflying aircraft and the well-lit context combine to create a low level of tranquillity.

Viewpoint 9: Balcombe Road at Pentagon Field

8.6.122 This is an open view looking north west across the cattle grazed Pentagon Field from a field entrance gate on Balcombe Road on the edge of the Project site boundary. Scrubby vegetation around a substation frames the view to the left and roadside hedgerows frame the view to the right. Hedgerows and mature trees around the field boundary filter views to Gatwick Airport's long stay surface car parks, decked car park and the green clad Courtyard by Marriott Hotel beyond. In summer the foliage screens all but a narrow glimpse of the upper levels of the hotel.

8.6.123 At night lighting columns associated with surface parking and light sources at the hotel are visible through the trees. Other light sources within the airport are less visible and more widely spaced across the remainder of the view. Skyglow is visible on the left side of the view towards the main airport area.

8.6.124 Receptors traveling along the road gain an urban fringe experience of fields, hedgerows and airport infrastructure glimpsed through trees. Traffic noise and the dominant influence of overflying aircraft immediately overhead create a low level of perceived tranquillity.

Viewpoint 10: Public right of way 359/Sy at Pentagon Field

8.6.125 This is an open view looking south across the cattle grazed Pentagon Field from a field entrance gate. Walkers using the public footpath 359/Sy, which follows a private access track from Balcombe Road, gain a brief view into the field framed by hedgerows and trees. The low managed field boundary hedgerow on Balcombe Road is visible to the left with the taller vegetation on the opposite side of the road beyond. Mature woodland at Pickett's Wood to the south of Pentagon Field and mature trees along the hedgerows to the west form a dense band of vegetation extending across the view from the right, obscuring views of the airport and the landscape beyond. Two mature oak trees lie within the field as focal points.

8.6.126 At night, lighting columns associated with surface parking and light sources at decked car parks are visible through the trees, more so in the winter when vegetation is not in leaf. Some skyglow is visible to the right of the view towards the main airport area.

8.6.127 Walkers using the path gain a rural fringe experience of fields, hedgerows and airport infrastructure glimpsed through gaps in vegetation. Traffic noise and the dominant influence of overflying aircraft immediately overhead create a low level of perceived tranquillity.

Viewpoint 11: Public right of way 360/1Sy at Tinsley Green

8.6.128 This is an open view looking west where the public right of way crosses the access road to the Crawley Sewage Treatment Works. Hardstanding, piles of materials and storage containers form discordant elements in the foreground. Hedgerows and mature oak trees form attractive historic field boundaries crossing the Project site and subdividing the parcels of grassland. Framed views into neighbouring fields are possible. Glimpses of large industrial buildings at the sewage treatment works can be gained to the right of the view. Views of the adjacent water drainage feature are obscured in the summer.

8.6.129 At night there are limited light sources within the view. Lighting at the sewage works may be visible and the general skyglow from the edge of Crawley and the airport.

8.6.130 The footpath beside woodland and open land with glimpses of infrastructure at the sewage works and background noise of traffic and overflying aircraft create a perception of a low level of tranquillity.

Viewpoint 12: Bridleway public right of way 352/Sy at Rowley Farm

8.6.131 This is an open view (approximately 340 metres to Project site boundary) looking north from public right of way 352Sy that crosses elevated land at Rowley Farm. Pasture fields divided by unmanaged hedgerows and trees extend across the foreground and slope down towards the airport. This vegetation combines visually with the woodland strip planted north of the A23 London Road to form a buffer to commercial development at Lowfield Heath and the buildings and infrastructure of Gatwick. The view is orientated towards the airport runways where aircraft taking off or landing diminish the perception of tranquillity within the urban fringe landscape of the Low Weald. The spire of the St Michaels and All Angels Church at Lowfield Heath forms a local landmark to the left of the view within the same angle of view as the large pale block of the Boeing hangar. The cluster of tall buildings at South Terminal rise up above the trees to the right of the view. Ridges of high land at Norwood Hill and the Surrey Hills AONB are visible on the horizon beyond. In summer the hedgerows and trees when in leaf screen many views of airport infrastructure and development at Lowfield Heath; however, the tops of the tallest buildings remain visible.

8.6.132 At night, lighting within airport buildings and car parks is visible as clusters of light on the left and right edges of the view, contrasting with the dark foreground of the farmed fields. The different types and colours of lights and illuminated signs are particularly apparent at the South Terminal. The concentration of lighting at Gatwick creates a skyglow effect within views.

8.6.133 The bridleway crosses a small remnant of farmland between the large-scale airport infrastructure and commercial edge of Crawley. In combination with traffic on the A23 and aircraft taking off and landing, receptors experience a low level of tranquillity.

Viewpoint 13: Ifield Road

8.6.134 This is a narrow, glimpsed view (approximately 940 metres to Project site boundary) looking east through a gap in the hedgerow beside a layby on Ifield Road. The view is aligned along the airport runways, directly beneath the flightpath of aircraft taking off or landing which diminishes the perception of tranquillity within the Low Weald landscape. The foreground and middle distance are occupied by open farmland with few trees or hedgerows. The flat open expanse of runways, taxiways and grassland lie within the centre of the view. This corridor is flanked by the buildings and infrastructure at Gatwick Airport. The South Terminal, piers, Boeing hangar, control tower and parked aircraft combine to form a cluster of development to the left of the view, partly screened by the noise bund on the western edge of the airport. Commercial development at Lowfield Heath, Gatwick staff car park and the decked Purple Parking and buildings on Lowfield Heath Road are visible to the right of the view. Woodland belts and blocks on Charlwood Road and around the car parks at South Terminal form a green buffer across much of the view, screening the wider landscape. In summer vegetation in leaf provides a greater degree of screening, however the airport infrastructure remains distantly visible.

8.6.135 At night, the concentration of light sources within the airport form a prominent strip of light across the view in an otherwise largely dark, rural landscape. Rows of runway lights are visible in the centre of the view within the largely dark expanse of grassland. A noticeable, wider skyglow effect is also created by the airport lighting which influences night time tranquillity within the Low Weald landscape. Lights on overflying aircraft are also prominent as moving light sources.

8.6.136 The immediate context of the view is rural farmland. However, the nearby airport and the dominant influence of overflying aircraft immediately overhead lead to a low level of tranquillity.

Viewpoint 14: Public right of way 344, Sussex Border Path east of Charlwood

8.6.137 This is a channelled view (approximately 360 metres to Project site boundary) looking south east across pasture farmland from public right of way 344 that follows a farm track. Hedgerows are managed to eye level, limiting views into field parcels or across to the surrounding landscape. Woodland planting along Horley Road and the River Mole on the north west side of Gatwick Airport screen most views of buildings and infrastructure. The control tower is visible, framed by mature trees in the foreground. The top of the Virgin hangar is visible above woodland to the right of this. The top of the Boeing hangar is visible in the centre of the view with the buildings of the 'Aquatics To Your Door' commercial property on Horley Road visible in front. In summer, the hedgerows and trees screen all views of Gatwick Airport infrastructure and buildings.

8.6.138 At night the control tower, and hangars are visible as illuminated structures in a predominantly dark rural landscape. The concentration of lighting at Gatwick creates a skyglow effect within views which influences night time tranquillity within the Low Weald landscape.

8.6.139 Walkers experience a rural landscape of farmed fields which is influenced by large scale buildings and infrastructure at the airport, visible beyond the treeline. Lighting and the sight and sound of aircraft taking off and landing create the perception of a low level of tranquillity.

Viewpoint 15: Norwood Hill

8.6.140 This is a distant open view (approximately 2.61 km to Project site boundary) looking south east across horse paddocks and farmland from Norwood Hill Road. Small woodland copses and mature hedgerow trees combine to form a band of vegetation, beyond which the infrastructure

and buildings at Gatwick Airport are visible. Tall structures and buildings including the North and South Terminals, Travelodge and Airport Inn, control tower and Boeing hangar are visible in the centre and left side of the view. On the right side of the view, the airport infrastructure visually merges with the Manor Royal Business Park and the urban centre of Crawley, extending the narrow strip of development across the whole view. The dark, wooded hills of the High Weald AONB form a backdrop to the view. In summer the foreground trees and woodland provide additional screening when in leaf; however, the airport and Crawley form a distant focus of the view.

8.6.141 At night, the concentration of lights at Gatwick Airport and Crawley form a distinct ribbon of light forms and colours across the whole view, contrasting with the dark rural foreground and background of the High Weald AONB. The lighting creates a wider skyglow effect which influences night time tranquillity within the Low Weald landscape.

8.6.142 The immediate context of the view is rural farmland; however, the distant views of the airport and Crawley and the visible and audible overflying aircraft lead to a medium level of tranquillity.

Viewpoint 16: Turners Hill

8.6.143 This is an open view (approximately 5.78 km to Project site boundary) looking north-west from elevated land within the High Weald AONB on the northern edge of the settlement of Turners Hill. A ‘pick your own’ property lies in the foreground comprising grass parking area with huts and outbuildings. The view extends over the top of trees within woodland copses that lie on land that slopes down to Crawley. Urban development is visible as a pale band of geometric blocks at Manor Royal on the northern edge of Crawley and within Gatwick Airport. The control tower forms a very small but distinctive vertical element within the view. Aircraft are visible taking off to the left of the view. The gently undulating landscape of the Low Weald continues beyond with the higher land of the Surrey Hills AONB in the far distance. A pylon tower is visible as a vertical element in the foreground. The distant sound of aircraft is apparent on a still day, although not particularly prominent.

8.6.144 At night, the concentration of lights at Gatwick Airport and Crawley create a distinct ribbon of light forms and colours across the centre of the view, contrasting with the dark rural foreground of the High Weald AONB and dark background of the Low Weald and Surrey Hills AONB. The skyglow effect is less apparent at this distance.

8.6.145 The immediate context of the view is rural farmland; however, the distant views of the airport and Crawley and the visible and audible overflying aircraft lead to receptors perceiving a medium level of tranquillity.

Viewpoint 17: Tilgate Hill Crawley Borough Council ‘Important View’

8.6.146 This is a distant framed view (approximately 5.23 km to Project site boundary) looking north from the car park at Tilgate Park. Groups of trees in grass cover a steep slope on the northern edge of the park. Narrow view corridors between trees extend over suburban development at Tilgate. The tops of tall buildings within the centre of Crawley are visible as pale blocks above the tree line. Aircraft are visible taking off from Gatwick Airport beyond the belt of intervening trees and buildings. The far distance is concealed by mist and would include the landscapes of the Low Weald and the Surrey Hills AONB. The distant sound of aircraft at Gatwick Airport is apparent, which is emphasized when the aircraft are also visible.

8.6.147 At night, street lighting within residential areas of Crawley is visible extending into the mid-distance. A greater concentration of light sources is visible within the centre of Crawley. Lighting at Gatwick Airport is visible beyond this as a minor intensification of light sources in the view, together with a general skyglow effect. The rural landscape of the Surrey Hills forms a dark backdrop.

8.6.148 Visitors to the park experience urban green space on the edge of a large settlement. Aircraft taking off at Gatwick are audible and briefly visible. Within the context of Crawley, the park has a medium perception of tranquillity; however, in terms of absolute tranquillity a receptor's perception is of low levels.

8.6.149 Figure 8.4.21 shows the locations of visual receptors also considered within this chapter that are not represented by a viewpoint location photograph.

Gatwick Overflights and Tranquillity

8.6.150 The Project would increase the number of flights in the area around Gatwick Airport. The methodology for assessing Airspace Change (CAP1616) requires the landscape, townscape and visual resources assessment to consider effects on the perception of tranquillity due to increased overflights within nationally designated landscapes.

8.6.151 The noise team have prepared a methodology for capturing and assessing overflight data that has informed the baseline for the assessment of effects on tranquillity (see Chapter 14 of the PEIR Appendix 14.9.2). An aircraft is defined as overflying an observer if it passes within 1.8 km of the observer at a height of 7,000 feet above local ground level. The Gatwick overflight baseline data are based on 92 days in summer 2018 and presented within a grid size of 3.6 km aligned with the runway orientation. The data for an average 24 hour period are presented as a heat map with the number of overflights defined for each grid square ranging from 1 to 10, 10 to 50, 50 to 100, 100 to 200 and greater than 200 (see Figure 8.6.3).

8.6.152 The baseline data capture all air transport movements associated with Gatwick Airport for arriving and departing aircraft. Arrival and departure routings will not change as a result of the Project and hence the baseline data show where effects due to an intensification of existing noise or visual impacts are likely to occur. Receptors within the landscape outside of these routes have been scoped out of the assessment as there are no proposed changes to routing and therefore these areas would not be overflown (and no change in tranquillity as a result of the Project is likely). No impacts are anticipated beyond this wider study area and effects on designated landscapes outside these areas have therefore been scoped out of the assessment.

8.6.153 To enable a complete baseline situation to be defined, non-Gatwick flights have also been assessed. These mainly originate from Heathrow Airport and Redhill aerodrome. To capture these non-Gatwick flights within the study area, GAL provided ten days of radar data within approximately 35 miles of Gatwick Airport during June and July 2018. A second heat map has been created which combines the two sets of data to form a complete baseline situation, indicating the results (see Figure 8.6.4).

8.6.154 The four nationally designated landscapes within this study area comprising the High Weald, Surrey Hills and Kent Downs AONBs and the South Downs National Park have been incorporated into these overflight heat maps to provide a baseline for the assessment of effects on tranquillity.

8.6.155 Figure 8.6.3 illustrates that a large proportion of the High Weald AONB coincides with existing Gatwick overflights at less than 7,000 feet above ground level. The main concentration of flights extends in a corridor east and fanning out and curving round to the south and west. Over 200 flights a day pass over areas to the east of Gatwick Airport in a corridor south of Edenbridge. A broader corridor of the AONB extending east and south from Hever to Crowborough is overflown by between 100 and 200 flights a day. These areas include popular and distinctive locations such as Hever Castle and the Ashdown Forest. Hever Castle is surrounded by formal gardens and parkland that are Grade 1 listed on the English Heritage Register of Historic Parks and Gardens. Visitors to the gardens experience a relatively large number of either visible or audible overflying aircraft. Ashdown Forest comprises a series of connected commons of open heathland and woodland fringes on a high sandy ridge. This is the largest area of public access land in the south east of England. Visitors to the landscape generally experience between 50 and 100 either visible or audible overflying aircraft within open and expansive views that are not typical of the wider East Sussex landscape and therefore valued by visitors. The majority of the remaining area of the AONB overflown at less than 7,000 feet by Gatwick aircraft lies in the north western half of the designation. Areas are generally overflown by 1 to 10 flights a day with smaller areas of 10 to 50 and 50 to 100 flights a day. Wakehurst Place Royal Botanic Gardens forms a popular location within this area. There is a narrow area of land close to and south of the airport which is not generally overflown. It extends from north Horsham, across Crawley and thereafter across the north fringes of the High Weald AONB towards the eastern edge of East Grinstead.

8.6.156 Large areas of the Surrey Hills AONB are overflown by Gatwick aircraft. A broad area of the designated landscape south of Godalming to Haslemere is overflown by 1 to 10 flights a day and an area east of Godalming to Dorking is generally overflown by 1 to 10 or 10 to 50 flights a day with a small area overflown by 100 to 200 flights a day. These areas include popular and distinctive locations such as Leith Hill and Witley and Milford Commons. Leith Hill lies within a large wooded landscape on the Greensand Ridge and is one of the highest points in the south east of England. Visitors to this popular viewpoint experience relatively low numbers of either visible or audible overflying aircraft within panoramic views. Witley and Milford Commons comprise a series of connected areas of public access land of open heathland and woodland fringes, owned by the National Trust. Visitors to the landscape experience either visible or audible overflying aircraft within open and expansive views.

8.6.157 Smaller areas of the landscape along the M25 corridor on the southern edge of the Kent Downs AONB between Merstham and Westerham and south of Sevenoaks are overflown by between 1 and 10 Gatwick flights a day. In these locations, the visible or audible presence of Gatwick aircraft make a limited contribution to the level of tranquillity experienced by people using the landscape of the Kent Downs AONB.

8.6.158 Areas on the northern fringes of the South Downs National Park are also overflown at less than 7,000 feet. This includes a larger area west of Petworth to Midhurst and north to Haslemere which is generally overflown by 1 to 10 flights a day. These areas include popular and distinctive locations such as Petworth House and Park and the Temple of the Winds at Blackdown. Petworth House is surrounded by pleasure grounds and a deer park designed by Capability Brown that are Grade 1 listed on the English Heritage Register of Historic Parks and Gardens. Visitors to the park experience a relatively small number of either visible or audible overflying aircraft. The Temple of the Winds at Blackdown comprises a mosaic of open heathland and woodland on a high ridge. Visitors to the landscape experience a relatively small number of either visible or audible overflying aircraft within open views. A smaller area of the national park north of Brighton

and Lewes and south to Seaford is also overflown by 1 to 10 Gatwick flights a day. These areas include popular and distinctive locations such as Ditchling Beacon and Firle Beacon which are linked by the South Downs National Trail. These two locations lie within open, farmed downland above the Sussex coastline. Visitors to the landscape experience a relatively small number of either visible or audible overflying aircraft within panoramic open views. In these locations, the visible or audible presence of Gatwick aircraft would make a limited contribution to the level of tranquillity experienced by people using the landscape of the South Downs National Park.

8.6.159 Tranquillity mapping prepared by CPRE has also been consulted as part of the baseline data gathering exercise. The CPRE map defines tranquillity based on land uses such as settlements, transport corridors and large scale industrial/commercial uses (see Appendix 8.6.2). The map does not take into consideration the effects on tranquillity of overflying aircraft in the wider landscape. There is no corridor to the east and west of Gatwick Airport, corresponding with the greatest concentration of aircraft taking off and landing, that is defined as less tranquil than the underlying land uses. Therefore, it does not appear that the presence of any overflying aircraft has formed part of the methodology for defining tranquillity.

Future Baseline Conditions

8.6.160 Several developments at Gatwick Airport are currently under construction and are due for completion shortly/have been completed since the surveys for the PEIR were completed. These developments are sufficiently far advanced that the scale, mass and architectural treatment can be understood within the existing baseline and they appear in baseline photography:

- Boeing hangar (under construction at time of survey, now operational);
- M23 Smart Motorway Project; and
- Temporary maintenance hangar.

8.6.161 Other known developments that are proposed/consented include the following:

- extension to Pier 6;
- alterations to Taxiway Quebec;
- reconfiguration of aircraft stands;
- resurfacing of the main runway in accordance with the usual maintenance schedule;
- replacement of the Instrument Landing System (ILS) localisers.
- multi-storey car park 4 (1,500 vehicles);
- multi-storey car park 7 (2,750 vehicles);
- use of robotics technology within existing long stay parking areas to increase capacity, resulting in an additional 2,500 spaces;
- highway improvements to North Terminal and South Terminal roundabouts, signalisation and signage;
- extension to the existing BLOC hotel (approximately 200 additional bedrooms);
- reconfiguration of the existing Hilton hotel to provide 50 additional bedrooms: and
- Gatwick Station improvements.

8.6.162 Multi-storey car parks 4 and 7 are likely to result in the greatest change to the existing baseline situation. Multi-storey car park 4 will be located immediately north of the existing short stay multi-storey car park 3 at South Terminal. The development will form a logical continuation of the scale, form and architectural treatment of built development in this location. Some mature trees and shrubs will be removed to accommodate the building, reducing the extent of green infrastructure

and increasing the mass of built form at South Terminal. The development will form an extension and intensification of the established building cluster at the airport. Multi-storey car park 7 will be located immediately north of Tunnel Road at North Terminal. The development will extend the scale and form of built development in this location, although it will adopt a different architectural treatment to existing buildings, which do not include multi-storey car parks. The building will be constructed on an existing surface car park and will not require the removal of any vegetation. The development will form an intensification of the established building cluster at the airport.

8.6.163 These developments will combine to create a slightly more intensely developed airport character. Each of the future baseline developments will reinforce locally distinctive patterns of development at Gatwick Airport and will not result in an overall change in the character or composition of the airport. The developments will not exert any additional influence over the surrounding landscape and townscape character areas or visual receptors within the study area.

8.6.164 All of these future baseline developments are scheduled to be complete by 2024. The completion of multi-storey car park 4 at South Terminal will obscure views from the short stay car park 3 for visitors to the airport, represented in Viewpoint 2. Any influence over the neighbouring landscape character area of Low Weald at Horley or views from this landscape or urban fringe would be barely perceptible. Therefore, there will be no difference in the future baseline situation for the purposes of the assessment within this chapter for the years 2024 to 2029, 2030 to 2032, 2033 to 2038 or 2038.

Air Traffic Movements Future Baseline Conditions

8.6.165 The effects on the perception of tranquillity within the study area are informed by data presented within Chapter 14: Noise of the PEIR. Chapter 14 focuses on the 2032 and 2038 assessment years, as the predicted changes in air traffic movements are likely to be greater than in the opening year of 2029. In terms of noise emission levels, the 2032 future baseline has been modelled based upon air traffic forecasts which include changes in the aircraft fleet to quieter types. It is predicted that in 2032 there would be a reduction in the area of landscape and townscape affected by aircraft noise and, therefore, the number of residents affected living in the affected area. Between 2032 and 2038 the fleet would continue to change to quieter types, resulting in further reduction in baseline levels.

8.7. Key Project Parameters

8.7.1 The assessment has been based on the parameters identified within Chapter 5: Project Description.

8.7.2 Table 8.7.1 below identifies the key parameters most relevant to this assessment. Where options exist, the maximum design scenario selected is the one having the potential to result in the greatest effect on an identified receptor or receptor group. Effects of greater adverse significance are not predicted to arise should any other option identified in Chapter 5 be taken forward in the final design of the Project.

Table 8.7.1: Maximum Design Scenarios

Potential Impact	Maximum Design Scenario	Justification
Initial Construction Phase: 2024-2029		
Airport character. Visual amenity: A23 and internal roads, railway, staff car parks.	Main contractor construction compound MA1 (up to 5 hectares including infrastructure up to 30 metres high)	Maximum footprint and height of development
Airport character. Visual amenity: Gatwick staff/visitors.	Airfield satellite contractor compound (up to 6 hectares including infrastructure up to 30 metres high)	Maximum footprint and height of development
Landscape/townscape character. Visual amenity: Horley residential edge, Balcombe Road and internal roads, multi-storey car parks, ITTS, railway, McDonalds, KFC, Schlumberger House, Marriot Hotel. Riverside Garden Park, Premier Inn and Travelodge, River Mole footpath, A23 and internal roads, multi-storey car parks, surface carparks, ITTS	Surface access satellite contractor compounds, South Terminal (up to 2 hectares including infrastructure up to 15 metres high), North Terminal (up to 1.6 hectares including infrastructure up to 15 metres high)	Maximum footprint and height of development and vegetation removal
Airport/Landscape character. Visual amenity: public footpaths, Balcombe Road, car parks,	Pentagon Field decked parking: 8.8 hectares to accommodate 5,800 cars up to 8 metres high on a landform up to 4.4 metres high accommodating 250,000 m^3 of spoil.	Maximum footprint, height of development, vegetation loss and spoil volume.
Airport/Landscape character. Visual amenity: Gatwick staff/visitors.	Replacement Purple Parking at Crawter's Field (5.7 hectares and 3,000 spaces)	Maximum footprint of development
Airport/Landscape character. Visual amenity: Gatwick staff/visitors.	Relocation of substations BP, BR and A (25 m^2 and 5 metres high)	Maximum footprint and height of development
	Relocation of substation J (180 m^2 and 6 metres high)	Maximum footprint and height of development
	Substation BK (144 m^2 and 6 metres high)	Maximum footprint and height of development
Landscape/Airport character. Visual amenity: River Mole footpath, Gatwick Museum	Museum Field flood compensation area (3.5 metres deep)	Maximum footprint, depth of feature and vegetation loss.
Landscape/Airport character. Visual amenity: River Mole footpath	East of Museum Field flood compensation area (1.8 metres deep)	Maximum footprint, depth of feature and vegetation loss.

Potential Impact	Maximum Design Scenario	Justification
Airport/Landscape character. Visual amenity: Gatwick staff/visitors.	Car park X flood alleviation area (2.5 metres deep)	Maximum footprint, depth of feature and vegetation loss.
Airport character. Visual amenity: Gatwick staff/visitors.	Underground surface water storage beneath Car Park Y	Maximum footprint and depth of feature.
Airport character. Visual amenity: Gatwick staff/visitors.	CARE facility (Phase 1 and start of Phase 2) relocation option 2 (1.76 hectares, 22 metre high buildings and 50 metre high flue) construction. Motor Transport Facilities (1.56 hectares and 15 metres high) and RVP North	Maximum footprint and height of development. Closer to airport perimeter, greater opportunity for effects on landscape and visual receptors outside airport.
Airport/Landscape character. Visual amenity: Lowfield Heath Road, Roband Electronics	Noise mitigation feature (assumed to be up to 12 metres high)	Indicative height of development
Airport/Landscape character. Visual amenity River Mole footpath	Fire training ground (1.2 hectares, up to 25 metres high)	Maximum footprint and height of development
Airport character. Visual amenity: Sofitel and Premier Inn, roads, ITTS, multi-storey car parks	North Terminal International Departure Lounge (IDL) extensions and forecourt (3,120 m^2 and 32.5 metres high and 3,180 m^2 and 27 metres high) construction and completion.	Maximum footprint and height of development
	North Terminal baggage reclaim extension (650 m^2 and 7 metres high) construction and completion.	
	North Terminal baggage hall extension (6,552 m^2 and 12.5 metres high) construction commenced	
Airport character. Visual amenity: Hilton Hotel, roads, multi-storey car parks.	South Terminal IDL Extension and forecourt (3,780 m^2 and 30.5 metres high) complete.	Maximum footprint and height of development
Landscape/Airport character. Visual amenity: Horley residential edge, Balcombe Road and internal roads, surface carparks, railway, McDonalds, KFC, Schlumberger House.	Surface Access, South Terminal roundabout improvements (including flyover) (8 metres high above finished ground level) and North Terminal roundabout improvements, construction commenced	Maximum footprint and height of development
Airport character.	Hotel at building compound adjacent to car rental location (200 rooms) (16.3 metres)	Maximum footprint and height of development and vegetation loss

Potential Impact	Maximum Design Scenario	Justification
Visual amenity: Public footpath, Roads, railway, multi-storey car parks and surface car parks.		
Airport character. Visual amenity: Sofitel, Pier 4, roads, multi-storey car parks	Multi-storey car park J (900 spaces, 1 hectare and 27 metres high)	Maximum footprint and height of development
Airport character. Visual amenity: Gatwick staff/visitors.	Pond A and River Mole diversion	Maximum footprint, volume and vegetation removal
Airport character. Visual amenity: Hilton Hotel, roads, multi-storey car parks and surface car parks.	Car park H (0.5 hectare and 1,800 spaces, 27 metres high)	Maximum footprint and height of development and vegetation loss
Landscape/Airport character. Visual amenity River Mole footpath	North Terminal Long Stay decked car park (4,500 spaces and 13 hectares) (11 metres) construction commenced	Maximum footprint and height of development and vegetation loss
Airport character. Visual amenity: Gatwick staff/visitors.	Grounds Maintenance (1230 m^2 and 8 metres high) Surface Transport Facility (1440 m^2 and 15 metres high)	Maximum footprint and height of development
Airport character. Visual amenity: Gatwick staff/visitors.	ITTS improvements to North and South Terminal stations	Maximum footprint and height of development.
Tranquillity	N/A (existing 2019 air traffic movements 893 per 24 hours (766 per 16 hour day))	2019 baseline situation for assessment.
2030-2032		
Airport character. Visual amenity: Hilton Hotel, roads, multi-storey car parks and surface car parks.	Three office blocks South Terminal (3,072 m^2 and 27 metres high) and South Terminal Hotel (400 bedrooms and 27 metres high)	Maximum footprint and height of development and vegetation loss
Landscape/Townscape character. Visual amenity: Horley residential edge, A23, River Mole footpath	Surface access satellite contractor compound Longbridge Roundabout (up to 0.65 hectares including infrastructure up to 5 metres high)	Maximum footprint and height of development and vegetation loss
Airport/Townscape character. Visual amenity: Horley residential edge, A23, Balcombe Road and internal roads, multi-storey car parks, ITTS, railway, McDonalds, KFC, Schlumberger House, Marriot	Surface Access, South Terminal roundabout improvements (including flyover) completed (8 metres high above finished ground level), Balcombe Road overbridge raised 2.2 metres and North Terminal	Maximum footprint and height of development and vegetation removal. Outside of airport perimeter, greater opportunity for effects on landscape and visual receptors outside airport

Potential Impact	Maximum Design Scenario	Justification
Hotel. Riverside Garden Park, Horley residential edge, Premier Inn NT and Perimeter Road North, Sofitel, Premier Inn and Travelodge, River Mole footpath, A23 and internal roads, multi-storey car parks, surface carparks, ITTS.	roundabout improvements (including flyover 8 metres high above finished ground level) and Longbridge Roundabout improvements including new River Mole bridge construction.	
Airport character. Visual amenity: Gatwick staff/visitors.	CARE facility location option 2 (1.76 hectares, 22 metres high buildings and 50 metre high flue) and Motor Transport Facility – completion of construction	Maximum footprint and height of development. Closer to airport perimeter, greater opportunity for effects on landscape and visual receptors outside airport.
Airport/Landscape character. Visual amenity: Gatwick staff/visitors.	Hangar (12,440 m^2 and 32 metres high)	Maximum footprint and height of development
Airport character. Visual amenity: Premier Inn NT and Perimeter Road North and Travelodge, River Mole footpath, A23 and internal roads, Horley residential edge, multi-storey car parks.	North Terminal hotel (400 bedrooms) (27 metres)/ multi-storey car park Y (1.9 hectares and 3,000 spaces)	Maximum footprint and height of development and vegetation loss.
Airport character. Visual amenity: Gatwick staff/visitors.	Pier 7 (10 hectares and 18 metres high)	Maximum footprint and height of development and vegetation loss.
Airport character. Visual amenity: Gatwick staff/visitors, Hampton Hilton Hotel.	Internal access: Larkins Road diversion (Phase 2) and autonomous vehicle route and stations	Maximum footprint and height of development
Tranquillity	Air traffic movements increase to 975 per day.	Maximum number of air traffic movements.
2033-2038		
Landscape/Airport character. Visual amenity River Mole footpath	North Terminal Long Stay decked car park (Phase 2) (4,500 spaces and 13 hectares) (11 metres)	Maximum footprint and height of development and vegetation loss
Airport character. Visual amenity: Gatwick staff/visitors.	Pier 7 (10 hectares and 18 metres high)	Maximum footprint and height of development and vegetation loss.
Landscape/Airport character. Visual amenity: Public footpath, residents.	Gatwick Stream flood compensation area (up to 3 metres deep) construction	Maximum footprint, depth of feature and vegetation loss.

Potential Impact	Maximum Design Scenario	Justification
Airport character. Visual amenity: Gatwick staff/visitors, Hampton Hilton Hotel.	Internal access: Larkins Road diversion (Phase 2) and autonomous vehicle route and stations	Maximum footprint and height of development
Tranquillity	Air traffic movements increase to 975 per day.	Maximum number of air traffic movements.
Design Year: 2038		
Landscape/Airport character. Visual amenity: Public footpath, residents.	Gatwick Stream flood compensation area (up to 3 metres deep)	Maximum footprint, depth of feature and vegetation loss.
Tranquillity	Air traffic movements increase to 1120 per day.	Maximum number of air traffic movements.

8.8. Mitigation and Enhancement Measures Adopted as Part of the Project

8.8.1 A number of measures have been designed into the Project to reduce the potential for impacts on landscape, townscape and visual resources. These are listed in Table 8.8.1.

Table 8.8.1: Mitigation and Enhancement Measures

Measures Adopted as Part of the Project	Justification
Mitigation	
Vegetation retention strategy for all elements of the Project that coincide with existing significant vegetation including hedgerows, woodland, trees, shrubs, wetland and amenity planting or elements of the Project that lie immediately adjacent to significant vegetation that may be affected during the construction phase or during maintenance activities.	To ensure green infrastructure assets are retained wherever possible and adverse impacts on the important features and locally distinctive patterns of development at Gatwick Airport are minimised. To minimise adverse impacts on the character of surrounding landscapes and townscapes. To prevent coalescence of the airport and settlements of Crawley and Horley. To protect important urban green spaces including Riverside Garden Park. To ensure that visually significant vegetation is retained to minimise adverse effects on visual receptors, protect important views and protect the natural beauty and setting of AONBs.
Proposed public open space and footpaths.	To provide a new area or areas of public open space with links to the existing area of Riverside Garden Park. To provide an extension to the River Mole footpath and associated publicly accessible land.
Proposed woodland, tree, scrub, shrub, wetland, amenity and grassland planting. The	To ensure a high quality environment is created within the airport and surrounding landscape/townscape.

Measures Adopted as Part of the Project	Justification
'design year' for tree and shrub planting is 15 years after implementation. This is considered to be the time when vegetation provides a high level of screening or design contribution to the Project. This chapter assesses the elements of the Project at Year 1 when planting is implemented and at Year 15, or before at 2038, where applicable.	To provide replacement/compensation planting where vegetation has been removed, particularly at the North Terminal roundabout improvements.
Proposed earth shaping, embankments, cuttings or bunds.	To ensure that visual screens are provided to minimise adverse effects on visual receptors. To provide replacement/compensation features where they have been removed.
Proposed fences, walls or barriers.	To ensure that visual screens are provided to minimise adverse effects on visual receptors. To provide replacement/compensation features where they have been removed.
Proposed hard landscaping.	To ensure a high quality environment is created within the airport and surrounding landscape/townscape.
Lighting	A lighting strategy will be prepared for the Project, which will take into account the Guidance Notes for the Reduction of Obtrusive Light (Institute of Lighting Professionals, 2011)
Enhancement	
Management of, or implementation of, proposed mitigation to enhance existing green infrastructure including hedgerows, woodland, trees, shrubs, wetland and amenity planting.	To enhance the character and biodiversity of the airport and surrounding landscape/townscape. To enhance the screening capacity of visually significant vegetation.

8.9. Assessment of Effects

Initial Construction Phase: 2024-2029

8.9.1 This section describes the effects that would arise as a result, primarily, of construction activities during the period up to opening of the altered northern runway, although does include some elements of the Project that would be complete and operational before the end of 2029. Key effects are summarised in table format in the summary section at the end of the chapter (see Table 8.13.1). A focussed summary of effects on receptors at representative viewpoints can be found at Appendix 8.9.1, for all assessment phases.

8.9.2 A summary of the maximum design scenario dimensions required for the construction of the following elements of the Project is provided in Table 8.7.1. Photomontages have been prepared for 10 of the representative viewpoint locations illustrating the massing outlines of key elements of

the Project based on winter and summer photography (See Figures 8.9.1 to 8.9.36). Further detail relevant to this section of the assessment is provided below.

Alterations to the Existing Northern Runway

8.9.3 The existing northern runway would be adjusted to reposition the centreline 12 metres further north. The redundant 12 metre strip to the south would be broken out and removed, and then replaced with airfield grassland. The altered runway would be resurfaced and new markings applied.

Reconfiguration/Modification of Taxiways and Holding Areas

8.9.4 The realignment of Taxiway Juliet and the new Taxiway Juliet West Spur would require the construction of new areas of hardstanding. Redundant sections of hardstanding would be broken out and removed, and then replaced with airfield grassland. The altered taxiways would be resurfaced and new markings applied. The new aircraft holding area/Charlie Box would be created by reconfiguring the existing apron and stand area north of Taxiway Juliet.

8.9.5 The extension of Taxiway Lima and Tango: end around taxiway west; end around taxiway east; and new runway exits/entrance taxiways would require the construction of new areas of hardstanding. The altered or new taxiways would be resurfaced and markings applied.

Main Contractor Construction Compound MA1

8.9.6 This would be a securely fenced compound of up to 5 hectares in an area north and east of Perimeter Road South on an area of hardstanding currently occupied by car parking. The compound would contain offices, welfare facilities, laydown area, materials storage, parking and a bus terminal. Batching plants up to 30 metres high would form the tallest elements within the compound.

Airfield Satellite Contractor Compound

8.9.7 This would be a securely fenced compound of up to 6 hectares in an area west of Taxiway Uniform on an area previously occupied by a construction compound for the Boeing hangar, grassland, reed bed and hedgerow. The compound would contain offices, welfare facilities, laydown area, materials storage, parking and a bus terminal. Batching plants up to 30 metres high would form the tallest elements within the compound.

Surface Access Satellite Contractor Compound: South Terminal

8.9.8 This would be a securely fenced compound up to 2 hectares in an area of grazing pasture crossed by hedgerows either to the north of the South Terminal roundabout or south of the M23 spur. The compound would contain offices, welfare facilities, laydown area, materials storage, parking and a bus terminal. Infrastructure would be up to 15 metres high. For the purposes of this chapter, the compound option north of the South Terminal roundabout has been assessed as the maximum design scenario.

Surface Access Satellite Contractor Compound: North Terminal

8.9.9 This would be a securely fenced compound of up to 1.6 hectares, currently occupied by hardstanding for staff car park Y. The compound would contain offices, welfare facilities, laydown area, materials storage, parking and a bus terminal. Batching plants up to 15 metres high would form the tallest elements within the compound.

Pentagon Field Decked Parking

8.9.10 The grazing pasture at Pentagon Field would be removed and the location would initially be used as a spoil receptor site to accommodate a depth of up to 4.4 metres of material. Construction works to provide car parking for 5,800 cars in a decked car park structure up to 8 metres high, occupying a footprint of approximately 8.8 hectares would be undertaken. The operational car park would be enclosed by metal mesh security fencing and mounted lighting would be erected throughout. The implementation of landscape planting proposals around the site perimeter to blend into existing native hedgerows and trees is likely to take place between winter 2029 and winter 2030.

Replacement Purple Parking at Crawter's Field

8.9.11 The grassland and woodland would be cleared, a tarmacadam hardstanding constructed, and road markings and bays applied. The car park would be enclosed by metal mesh security fencing and column mounted lighting would be erected throughout. The implementation of landscape planting proposals to blend into existing native hedgerows and trees is likely to take place between winter 2026 and winter 2027.

Relocation of Substations BP, BR, and A

8.9.12 Substations BP, BR and A would be re-provided, each within an area of approximately 25 m^2, with a maximum height of 5 metres above ground level and up to 3 metres below ground level.

Substation J

8.9.13 This replacement substation is likely to comprise a containerised substation, with an additional generator and transformer to replace Substation BM. The substation would occupy an area of approximately 180 m^2, with a height of 6 metres above ground level and 3 metres below ground level.

Substation BK

8.9.14 Substation BK would be re-provided within an area of approximately 144 m^2, with a maximum height of 6 metres above ground level and 3 metres below ground level

Surface Water Management Features

8.9.15 The relocation of Pond A would take place during the construction phase (to allow completion of the works to taxiways). This would require establishing the pond in its final location further north of the existing location. In addition, it is proposed that the River Mole channel would be widened, reprofiled and relocated to the north of Pond A. Construction activities would require the removal of existing wetland planting, hedgerows and mature trees.

8.9.16 At Museum Field, a flood compensation area would be created with excavation up to approximately 3.5 metres deep within an existing grass field defined by hedgerows and trees. This would be connected to the River Mole by a 12 to 15 metre wide spillway.

8.9.17 The flood compensation area east of Museum Field would require excavation up to approximately 1.8 metres deep within an existing area of grassland and scrub, connected to the River Mole by a spillway. The implementation of landscape planting proposals within these two areas, including wetland grassland, marginal species and native tree and scrub planting, is likely to take place between winter 2025 and winter 2026.

8.9.18 The underground storage feature beneath Car Park Y would require large-scale excavation. The existing Car Park X would be excavated to create a new flood compensation area within the same development footprint and an appropriate car park surface reinstated.

CARE Facility (Option 2) Phase 1 and Commencement of Phase 2

8.9.19 Construction of the CARE facility would require the breakout and removal of existing car park hardstanding, removal of 2 metre high perimeter timber fences and the removal of trees and potentially hedgerow vegetation. The new compound would be approximately 17,550 m^2 and enclosed by secure fencing. The compound would contain biomass boilers, a material recovery facility, a card baling facility, office and welfare facilities and a materials storage area. The main building would be up to 22 metres high, with a 50 metre high flue. Lighting columns and wall mounted lights would provide appropriate light levels for safe night time working.

Noise Mitigation Feature

8.9.20 Reshaping and relocation of the existing noise bund would involve the clearance of the young woodland planting which currently covers the bund. A new earth bund or wall would be constructed adjacent to Lowfield Heath Road and native woodland established to provide an appropriate treatment adjacent to the neighbouring Upper Mole Farmlands and provide an equivalent degree of screening. The implementation of landscape planting proposals is likely to take place between winter 2024 and winter 2025.

Fire Training Ground

8.9.21 The fire training ground would be consolidated and re-provided immediately to the north of its current location. It would include a test rig and other structures up to 25 metres high and lighting columns. Earthworks in the area would be re-engineered to accommodate the flat area of hardstanding and some trees and scrub would be removed. The implementation of any landscape planting proposals is likely to take place between winter 2024 and winter 2025.

North Terminal Extension and Forecourt

8.9.22 The main improvements to the North Terminal International Departure Lounge (IDL) would include a northern extension of 3,120 m^2 and 32.5 metres high and a southern extension of 3,180 m^2 and 27 metres high. In addition, an extension of 6,552 m^2 and 12.5 metres high to the baggage hall and an extension of 650 m^2 and 7 metres high to the baggage reclaim area are proposed. Small amounts of hard and soft landscape would be removed within the forecourt area and re-provided. All works would be complete and operational by 2028, with the exception of the baggage hall extension. The implementation of landscape planting proposals is likely to take place between winter 2027 and winter 2028.

South Terminal Extension and Forecourt

8.9.23 This would include the construction phase and operation of a terminal building extension over four levels up to 30.5 metres high and with a footprint of approximately 3,780 m^2 and a two-storey autonomous vehicle transition space to Pier 7. This would include enhancements to transport corridors, parking areas and pedestrian circulation space. All works would be complete and operational by 2027. The implementation of landscape planting proposals is likely to take place between winter 2027 and winter 2028.

Surface Access Improvements

8.9.24 Lead in works for the commencement of construction of the improvements to the South Terminal roundabout and North Terminal roundabout would take place in 2028 and 2029, including highways vegetation removal.

Hotel at Building Compound Addjacent to Car Rental Location

8.9.25 This would include the construction phase and operation of hotel with up to 200 bedrooms adjacent to the car rental site at South Terminal, up to 16.3 metres in height. The implementation of landscape planting proposals is likely to take place between winter 2025 and winter 2026.

Multi-storey Car Park J

8.9.26 This would include construction phase and operation of parking for 900 cars in a building up to 27 metres high and a footprint of 1 hectare. The implementation of landscape planting proposals is likely to take place between winter 2027 and winter 2028 (after completion of Phase 2 of the construction).

Car Park H

8.9.27 Construction and completion of Phase 1 of this multi-storey 1,800 space car park would be undertaken covering an area of 0.5 hectares and up to 27 metres high.

North Terminal Long Stay Decked Car Park

8.9.28 Construction and completion of Phase 1 of this 4,500 space decked car park would be undertaken covering 13 hectares and up to 11 metres high.

Grounds Maintenance/Surface Transport Facility

8.9.29 Adjacent facilities incorporating separate buildings up to 8 metres and 15 metres high respectively, storage and parking within a fenced yard covering 2.67 hectares would be provided.

Inter-terminal Transit System (ITTS)

8.9.30 The construction phase for improvements to the ITTS would be completed during this period and may include platform and canopy extensions at North and South Terminal stations.

Effects on Landscape Character

Gatwick Airport Urban Character Area

8.9.31 The construction and operational elements described above are located mainly within the existing airport character area. The heavy plant and operations required to undertake the construction works associated with the alterations to the hardstanding of the northern runway, reconfiguration/modifications of taxiways, holding areas and stands would temporarily introduce a slightly discordant element into the airport. Construction compounds would be created within the airport. The surface access satellite contractor compound for the North Terminal roundabout improvements would be located at the redeveloped staff car park Y, previously excavated to accommodate an underground surface water storage facility. The compound and associated activities, including large scale batching plant, would introduce a small concentration of discordant elements into the airport. The loss of green infrastructure in some of these locations and its replacement with the construction compounds and associated activities, including large

scale batching plants, would introduce small concentrations of discordant elements into the airport. The construction of the CARE facility would also require the removal of green infrastructure and the inclusion of large scale tall infrastructure. The placement of spoil and the creation of decked parking at Pentagon Field and replacement Purple Parking at Crawter's Field would result in the loss of relatively large areas of grassland and green infrastructure. The relocation of five substations and the removal of two substations would, on balance, create very minimal change within the airport. Temporary lighting would be required to provide a safe and appropriate working environment during the construction phase.

8.9.32 The construction works and completion of the flood compensation areas at Museum Field and east of Museum Field would require the stripping of grassland and soils and the clearance of small areas of trees and hedgerow vegetation to gain access and create links to the River Mole. The facilities would be seeded and planted to reflect the wetland context of the River Mole and the pasture fields of the neighbouring Mole Valley Open Weald. The relocation of Pond A would require the removal of wetland planting and filling of part of the channel. The rural fringe character of these areas of landscape would be temporarily affected by the discordant construction activities, whilst the operational phase of these elements of the Project would be relatively low key in nature and would lead to limited adverse effects on the fringes of the airports character. The construction activities for the underground surface water storage facility at car park Y would involve removal of this car park and excavations to create the facility. The construction and completion of the flood compensation area at car park X would require the removal of the existing car park, including groups of mature trees, excavations and construction of a new car park surface. The temporary loss of mainly surface car parking and some vegetation to accommodate the works would, however, ensure that, on balance, there would be a minimal effect on character.

8.9.33 The construction works for the North Terminal IDL and baggage hall extensions and the nearby multi-storey car park J would result in changes to prominent buildings and areas within the airport that would be discordant in nature. The completed car park J within this phase would be less discordant within this established urban character context of the airport and would offer some opportunities for landscape planting as there would also be at the North Terminal IDL. The construction activities associated with the creation of the improved South Terminal roundabout would commence in this period, with the clearance of the majority of woodland planting and mature trees to the north and south of the A23/M23 Spur and within the roundabout together with the initial groundworks to create the flyover. The character of this section of the highway network would be considerably changed through green infrastructure loss to accommodate the slightly discordant activities of highways construction.

8.9.34 The construction phase and completion of the South Terminal IDL extension, Hotel at the building compound adjacent to the car rental location and the hotel at car park H adjacent to the Hilton Hotel at South Terminal would increase the scale and mass of tall buildings within this cluster. The construction phase would involve tall structures such as cranes and activities that would temporarily form a discordant addition to the character of the airport. The completed buildings would be prominent within the airport although they would adopt appropriate high quality architecture to ensure the appearance of the building cluster is maintained or enhanced. The loss of mainly surface car parking and low-level buildings of minimal architectural quality to accommodate the improvements would however ensure that, on balance, there would be a neutral effect on character. Existing mature tree and shrub planting around existing car park H would be retained to ensure a high quality setting and visual screen is retained within which to

locate new development. New tree and shrub planting would be incorporated into these schemes to soften the urban form and provide an attractive environment, particularly at ground level.

8.9.35 The construction phase of the North Terminal Long Stay decked car park would introduce large scale activities into the airport. The nature of the activities and the high-level cranes required would temporarily result in prominent and discordant additions to the airport. The existing character of surface car parking would be replaced by construction compounds and activities.

8.9.36 The reconfiguration of the grounds maintenance and surface transport facilities would lead to short term construction effects of the relatively small scale activities and long term operational effects due to the small loss of surface parking and the erection of replacement buildings up to 15 metres high.

8.9.37 The construction activities associated with improvements to the platforms of ITTS station stops at North and South Terminals would have very limited influence over the established airport character.

8.9.38 The nature and scale of the range of construction phase activities would not be completely out of character within an operational airport. The newly operational elements of the Project would be typical of the existing airport and would provide an intensification of existing character. The clearance of areas of green infrastructure to facilitate construction, including diversion of the River Mole, would result in the greatest direct effect on the character area. The Gatwick Airport urban character area would generally be of low sensitivity to a medium magnitude of impact. The duration of these effects would range from short term to medium term. Overall the level of effect would be **minor adverse**, during the day and at night, which would not be significant. However, the loss of pasture, spoil placement and the construction activities for the decked parking at Pentagon Field would have a **major adverse** effect, which would be significant, on this specific parcel of land due to its medium sensitivity to a high magnitude of change.

Low Weald Character Area

8.9.39 The contractor compound north of the South Terminal roundabout would lie within the Low Weald character area within Reigate and Banstead District to the north of Gatwick Airport. The heavy plant and operations required to undertake the construction works would be prominent within horse paddocks on this edge of the character area. This would create a discordant element that has a direct effect on the character area and that would have an influence over the neighbouring urban fringe fields and settlement edge at Horley. The edge of the character area would temporarily be considerably changed through loss of grassland and openness to accommodate the compound construction. The early stages of removal of highway woodland planting and trees to accommodate the construction site for the improved South Terminal roundabout would be at the airport's interface with the Low Weald landscape character area. However, this remnant of farmland within the wider character area is currently highly influenced by the road corridor and urban edge and is considered to be of low sensitivity to this type of change. The high magnitude of direct impact on the fields within the compound site would result locally in a **moderate adverse** effect during the day and at night, which would not be significant. The hotel at the building compound adjacent to the car rental location and the new hotel and two new multi-storey car parks at South Terminal car park H would increase the scale and mass of tall buildings within this cluster. This increase in development would intensify the existing influence that buildings at South Terminal have over the wider landscape of the Low Weald in Reigate and Banstead District and

combined with the minimal influence of the compound would create a medium impact, resulting in a **minor adverse** effect, which would not be significant.

High Woodland Fringes Character Area

8.9.40 At a district level, the location of several of the construction elements near the airport boundary would result in effects on the surrounding rural characteristics of the High Woodland Fringes character area within Crawley District. The decked car parking on raised land at Pentagon Field would lie adjacent to the rural farmland east of the airport. The heavy plant and operations required to place and spread the spoil and undertake the construction activities for the decked car park at Pentagon Field, including cranes, would be discordant in nature and would have an influence over the neighbouring landscape. New hedgerow and tree planting located around the perimeter of the area would be immature during this early phase and only just starting to mitigate effects on the neighbouring rural landscape.

8.9.41 The character and activities associated with the existing airport form an established element of the study area and a context for the construction activities. The characteristic of rural farmland adjacent to an international airport forms an intrinsic part of the High Woodland Fringes character area. The characteristics of the relevant construction activities would be relatively prominent. The sensitivity of the High Woodland Fringes in this context is low and the magnitude of change would be low, resulting in **minor adverse** effects in the medium term during the day and at night, which would not be significant.

Mole Valley Open Weald Character Area

8.9.42 The construction activities for the flood compensation areas at Museum Field, due to their discordant nature, would have effects on the surrounding rural characteristics of the Open Weald in the Mole Valley district. The sensitivity of the character area to these effects in this context is low and the magnitude of change would be low, resulting in **negligible adverse** effects in the medium to long term during the day and at night, which would not be significant.

Upper Mole Farmlands Character Area

8.9.43 The landscape to the south and west of Gatwick Airport lies in the Upper Mole Farmlands area of Crawley District. The activities associated with the reshaping and relocation of the existing noise mitigation feature on the western edge of the airport would also influence the character of neighbouring farmland in the immediate context of the airport.

8.9.44 The construction activities associated with the replacement of the Purple Parking at Crawter's Field and the excavations for surface water management at car park X, although on the edge of the airport, would benefit from a tree belt providing separation from the surrounding rural landscape.

8.9.45 Gatwick Airport forms an established element of the study area and provides a context for the construction activities. The sensitivity of the Upper Mole Farmlands in this context is low and the magnitude of change would be low, resulting in **negligible adverse** effects in the medium term during the day and at night, which would not be significant.

Effects on Townscape Character

Northgate Crawley Townscape Character Area

8.9.46 The scale and mass of the 30 metre high batching plant within the main contractor construction compound, MA1, and of the Grounds Maintenance/Surface Transport Facility construction, would have an influence over the neighbouring Northgate townscape character area of Crawley to the south. The urban character area would be of low sensitivity to a low impact in the long term. The level of effect would be **minor adverse** during the day and at night, which would not be significant.

Horley Townscape Character Area

8.9.47 The construction site, activities and compound for the improvements to the South Terminal roundabout would be located near (but outside of) the suburban edge of this character area, resulting in impacts on the townscape. The scale and discordant nature of the activities would influence a townscape of low sensitivity. A low magnitude of change in the long term would result in a **negligible adverse** effect, which would not be significant.

8.9.48 Effects would be concentrated within the airport and adjoining landscape and townscape of Crawley and Horley districts. There would be no impact on the character of wider landscape and townscape areas within the 5 km radius study area.

Effects on Visual Amenity

Members of Gatwick Staff

8.9.49 The majority of the construction activities and operational elements of development described in the section above would be visible to members of Gatwick Airport staff working in different locations within the airport or using staff car parks and internal access roads. People at their place of work are generally considered to have a low sensitivity to change, particularly given the nature of the change and the context of a busy international airport. The construction activities and the completed elements of the Project may be barely perceptible when seen at distance, or prominent when in close proximity. The magnitude of change would range from negligible to medium resulting in **negligible** to **minor adverse** effects, which would not be significant.

Members of the Public Visiting Gatwick

8.9.50 Some elements of the construction activities and operational elements of development described in the section above would be visible to members of the public using the airport.

8.9.51 The northern runway and taxiway reconfiguration works, noise mitigation feature, fire training ground, relocation of Pond A, replacement parking at Crawter's Field, the airfield satellite contractor compound and flood compensation area at Museum Field would be apparent in views from the south side of the airport at Purple Parking. The activities and developments would be visible in the context of a busy operational airport, particularly with the Boeing hangar directly behind in most views. Occupiers of vehicles are receptors of low sensitivity to a low magnitude of change resulting in a **minor adverse** level of effect during the day and at night, which would not be significant.

8.9.52 Members of the public using the access roads, North and South Terminals, and North Terminal long stay surface car parks and multi-storey car parks would gain some near open views of

construction activities at the CARE facility, North and South Terminal extensions and Long Stay car park, the new hotel at the building compound adjacent to the car rental location, multi-storey car parks J and H, excavations for the underground surface water storage facility at Car Park Y and the hotel at South Terminal. These elements are all large scale and would generally require high level elements such as cranes. The nature and extent of these activities would form discordant elements within the existing airport context and during later stages of the phase would be visible alongside completed new developments. Pedestrians in urban spaces within the airport are receptors of medium sensitivity to no more than a medium magnitude of change, resulting in a **moderate adverse** level of effect during the day and at night, which is not significant. Occupiers of vehicles are receptors of low sensitivity to a medium magnitude of change, resulting in a **minor adverse** level of effect during the day and at night, which would not be significant.

Walkers Using Public Rights of Way

Public Right of Way 359Sy Pentagon Field

8.9.53 Receptors in this location are represented by Viewpoint 10. Walkers would gain open, near views south from a footpath of spoil placement and construction works for the proposed decked car park at Pentagon Field and, at the end of the phase, the complete car park in operation. The construction activities would be discordant and prominent in this rural fringe location immediately adjacent to car parks at South Terminal. Some views would be gained within the context of car parks and decked car parks within the airport. Walkers are receptors of high sensitivity and would experience a medium magnitude of change, resulting in a **major adverse** effect during construction, which would be significant. The completed decked car park would have the same impact on visual receptors, initially before mitigation planting has established or matured.

Public Right of Way 360/Sy South Terminal

8.9.54 Receptors in this location are represented by Viewpoint 3. Walkers would gain open views north of the new hotel at building compound adjacent to the car rental location. The building would add to the concentration of development at South Terminal. The scale and architecture of the hotel would enable an enhancement of the view of the terminal by replacing views of the existing multi-storey car park. Walkers are receptors of high sensitivity and would experience a medium magnitude of change. The adverse impacts of increased scale of development would be partially offset by the beneficial impacts of improved architectural quality within the view. Overall, there would be a **minor adverse** level of effect during the day and a **negligible** effect at night, in the long term, which would not be significant.

Public Right of Way 362a Horley

8.9.55 Receptors in this location are represented by Viewpoint 8. Open views across a foreground of grazed horse paddock would extend up to the contractor compound for the South Terminal roundabout. Hoardings would define the boundary with large plant and activities visible above and the tall elements of the batching plant particularly prominent against the skyline. Walkers are receptors of high sensitivity and would experience a medium magnitude of change resulting in a **moderate adverse** effect during the day and a low magnitude of change and a **minor adverse** effect at night, for the long term, which would not be significant.

Cyclists

National Cycle Route 21

8.9.56 Cyclists using the national cycle route between the A23 and the railway would gain filtered views through vegetation, in winter only, of the tallest elements within the main contractor compound that would be of negligible magnitude, leading to **minor adverse** effects, which would not be significant. In addition, when travelling further north, views of the new hotel at building compound adjacent to the car rental location would add to the concentration of development at South Terminal. The scale and architecture of the building would enable an enhancement of the view of the terminal by replacing views of the existing multi-storey car park. Receptors would be of high sensitivity to a low magnitude of change, resulting in a **minor adverse** effect, which would not be significant. Early stages of vegetation removal for surface access improvements at the end of this phase may be visible from the cycleway within Riverside Garden Park. Views of traffic and construction infrastructure may be visible, heavily filtered through trees within the park. Receptors would be of high sensitivity to a negligible magnitude of change, resulting in a **negligible adverse** effect, which would not be significant.

Occupiers of Commercial Properties

Premier Inn

8.9.57 Occupiers of the Premier Inn Hotel at North Terminal would gain views of the North Terminal extension construction activities and the excavations at car park Y. Occupiers of hotel rooms are receptors of medium sensitivity to a low to medium magnitude of change resulting in a **minor to moderate adverse** effect during the day and at night, which would not be significant.

Hilton Hotel

8.9.58 Occupiers of rooms on the east facing elevation of the Hilton Hotel would initially gain near, open views of the extensive construction site and activities for the hotel and multi-storey car parks at car park H. The scale and nature of the activities would be discordant and dominant in some views. Receptors would be of medium sensitivity to a medium magnitude of change in the medium to long term, resulting in a **moderate adverse** effect during the day and at night, which would not be significant. When complete, the new buildings would form an extension of the cluster of buildings at South Terminal. Part of the open views of the existing car park and surrounding trees would be replaced by large scale tall buildings in close proximity. The completed buildings would be prominent in views, although they would be of an appropriate, high quality architectural treatment. Receptors would experience a medium magnitude of change in the long term, resulting in a **moderate adverse** effect during the day and at night, which would not be significant.

Roband Electronics

8.9.59 Construction works for the noise bund would be visible in near, open views gained by people at their place of work immediately adjacent to the airport. Removal/remodelling of the earth bund and the vegetation on it would open up some views across the airport. The remodelling activities and construction of a new barrier would be discordant and at times prominent, in winter when vegetation around the property is not in leaf, in close proximity to receptors. Occupiers of the property are receptors of low sensitivity to a medium magnitude of change resulting in a **minor adverse** level of effect during the day and at night, which would not be significant.

Meadowcroft House

8.9.60 Occupiers of the office building at Meadowcroft House on the southern edge of Horley would lie immediately adjacent to the contractor compound for the South Terminal roundabout improvements. Trees and hedgerows along the northern boundary of the compound would be retained and protected during the construction phase to ensure a screen is maintained to minimise any visual effects. In combination with mature boundary vegetation within the grounds of the property, views during summer when trees are in leaf would be largely screened. During the winter near filtered views south of the compound, taller infrastructure and activities would be prominent as discordant additions to views, in place of the horse paddocks. Lighting would also be visible in winter against a backdrop of existing lighting columns at the South Terminal roundabout. Occupiers of the property are receptors of low sensitivity to a medium magnitude of change resulting in a **minor adverse** level of effect during the day and at night, which would not be significant.

Occupiers of Vehicles and Trains

Lowfield Heath Road

8.9.61 Construction works for the noise bund would be visible in near, open views gained by occupiers of vehicles travelling along Lowfield Heath Road. The activities would be slightly discordant at the interface of the airport with the rural landscape. Some views would be gained with a backdrop of the airport, opened up as the earth bund is remodelled. Occupiers of vehicles are receptors of low sensitivity to a medium magnitude of change resulting in a **minor adverse** level of effect during the day and at night, which would not be significant.

Balcombe Road

8.9.62 Receptors using Balcombe Road adjacent to Pentagon Field are represented by Viewpoint 9. Spoil placement activities and construction works for the decked car park at Pentagon Field would be large in scale, conspicuous and discordant in nature. The construction phase would completely change the character of a grazed field on the perimeter of the airport in the short term. Construction activities would be visible in near, open views gained by occupiers of vehicles travelling along Balcombe Road or pedestrians using the roadside pavement. The activities would be prominent at the interface of the airport with the rural landscape. Some views would be gained with a backdrop of decked car parks and hotels within the airport. Occupiers of vehicles are receptors of low sensitivity to a high magnitude of change during construction resulting in a **moderate adverse** level of effect during the day and at night, which would not be significant. Pedestrians using the pavement are receptors of medium sensitivity and would experience a **major adverse** effect which would be significant.

8.9.63 The completed decked parking at Pentagon Field would include large-scale concrete and steel structures with signage and lighting surrounded by a security fence. The car park would change the character of a grazed field on the perimeter of the airport. However, the roadside hedgerow would be retained and, if maintained to a higher level, would partially screen or soften some views of the new development. Decked car parks are a typical feature of the airport and would result in an intensification of an existing land use within views from the road. Occupiers of vehicles are receptors of low sensitivity to a high magnitude of change resulting in a **moderate adverse** level of effect during the day and at night, which would not be significant. Pedestrians using the roadside pavement are of medium sensitivity in this location. There would be a high

magnitude of change resulting in a **major adverse** level of effect during the day and at night, which would be significant.

8.9.64 Receptors travelling along Balcombe Road could also gain views of the contractor compound for the South Terminal roundabout improvements immediately north of the M23. Near open views from a short section of the road would include the compound and construction activities in place of the existing fields of grassland surrounded by trees and distant high-rise buildings at Horley. These discordant additions to the view would be prominent. Lighting would also be visible in winter against a backdrop of existing lighting columns at the South Terminal roundabout. Occupiers of vehicles would experience a medium magnitude of change resulting in a **minor adverse** level of effect and pedestrians using the pavement would experience a **moderate adverse** effect during the day and at night, which would not be significant.

Ifield Road

8.9.65 Receptors in this location are represented by Viewpoint 13. The heavy plant and construction activities associated with the northern runway, reconfiguration/modifications of taxiways and the noise mitigation feature have some potential to be visible through gaps in the roadside hedgerow in the middle distance. The activities are likely to be barely discernible from the backdrop of existing airport infrastructure. Occupiers of vehicles are receptors of low sensitivity to a negligible magnitude of change resulting in a **negligible** adverse effect during the day and at night, which would not be significant.

Railway

8.9.66 Occupiers of trains on the railway would gain brief, filtered views through rail side vegetation in winter only of the tallest elements within the main contractor construction compound and South Terminal satellite contractor compound, the Grounds Maintenance and Surface Transport buildings and the new hotel at building compound adjacent to the car rental location. Passengers would be of low sensitivity to a low to negligible magnitude of change, resulting in a **minor** or **negligible adverse** effect, which would not be significant.

Mid to Long Distance Views

8.9.67 Mid to long distance views from the surrounding landscape may include new tall buildings and high level construction activities such as cranes in several locations. These would form recognisable or barely perceptible additions, some slightly discordant in nature that, if visible, would be seen above intervening tree tops and within areas of existing built development at the airport. These types of views may be gained by medium to high sensitivity receptors at Viewpoint 12 at Rowley Farm bridleway, Viewpoint 13 at Lowfield Heath Road, at Viewpoint 14 on the Sussex Border Path east of Charlwood, Viewpoint 15 at Norwood Hill, Viewpoint 16 at Turners Hill and Viewpoint 17 at Tilgate Hill. The change in view would be no more than negligible, leading to **negligible to minor adverse** effects in the medium term, during the day and at night, which would not be significant.

Significance of Effects

8.9.68 No further mitigation or monitoring is required and therefore the significance of effects would remain as presented above in the short to medium term. However, planting proposals would be included in many of the elements of the Project design. At the time of assessment, the planting would be in place, but it would be immature and would not have reached its intended design year.

In time, as mitigation planting matures to soften and screen views of development, the level of effect on visual receptors is likely to reduce.

2030-2032

8.9.69 This section describes the effects that would arise as a result of ongoing construction activities occurring during 2030 to 2032 and the operational activities associated with the first full year of runway opening. Key effects are summarised in table format in the summary section at the end of the chapter (see Table 8.13.1).

8.9.70 A summary of the maximum design scenario dimensions required for the construction of the following elements of the Project is provided in Table 8.7.1. Further detail relevant to this section of the assessment is provided below.

Contractor Compounds: MA1, Airfield Satellite, North Terminal and South Terminal

8.9.71 These construction compounds would continue to be in use through this period.

Surface Access Satellite Contractor Compound: Longbridge Roundabout

8.9.72 This would be a securely fenced compound of up to 0.65 hectares, currently occupied by grassland surrounded by hedgerows and trees north of the Longbridge roundabout. The compound would contain offices, welfare facilities, laydown area and materials storage. Infrastructure would be up to 5 metres high and be in use from 2030.

CARE Facility

8.9.73 The completion of Phase 2 of the construction activities at the CARE facility would include an expansion of the Phase 1 development, including further construction of foundations and concrete slabs, installation of a biomass boiler (or equivalent) and bunded diesel tank. The facility would be completed during 2030 and would be 22 metres high with a 50 metre high flue. New hedgerow and tree planting would be located around the perimeter of the development, where possible, to compensate for any vegetation removal and provide an appropriate character within the airport and visual separation and screening from surrounding roads and public car parks. The implementation of landscape proposals is likely to take place between winter 2031 and winter 2032.

Motor Transport Facility

8.9.74 The completed Motor Transport Facility would include replacement storage buildings and workshop up to 15 metres high and refuelling and wash area. The compound would be approximately 15,600 m^2. As for CARE, Phase 2 works would be completed in 2030, with implementation of landscape proposals likely to take place between winter 2031 and winter 2032.

Hangar

8.9.75 The construction phase of a new hangar located north of Larkins Road is anticipated to commence in 2032. The building would be up to 32 metres high with a footprint of approximately 12,440 m^2.

North Terminal Hotel and Multi-Storey Car Park Y

8.9.76 Construction and completion of the 400 bedroom North Terminal hotel up to 27 metres high and Phase 1 of multi-storey car park Y with 4,000 spaces and a footprint of 1.9 hectares.

North Terminal Long Stay Decked Car Park

8.9.77 Construction and completion of Phase 2 of this 4,500 space decked car park would be undertaken, covering 13 hectares and up to 11 metres high.

Pier 7

8.9.78 Commencement of construction of buildings, structures and apron would take place.

Offices and Hotel at South Terminal

8.9.79 By 2032, the hotel with up to 400 bedrooms up to 27 metres in height and offices 3,072 m^2 and 27 metres high would be operational in the location of car park H. New ornamental tree and shrub planting would be located throughout external areas and around the perimeter of the development, where possible, to compensate for any vegetation removal and provide a high quality setting and appropriate character within the airport and visual separation and screening from surrounding roads and public car parks. The implementation of landscape proposals is likely to take place between winter 2031 and winter 2032.

Internal Access

8.9.80 Construction works would commence for the Larkins Road diversion and autonomous vehicle route and stations at North and South Terminals, as well as Pier 7.

North Terminal Extension

8.9.81 The construction works for the extension to the baggage hall at the North Terminal would be complete.

Surface Access Improvements

8.9.82 The main construction works for the South Terminal roundabout improvements would involve a flyover crossing the existing roundabout, approximately 8 metres high and 130 metres long supported by earthworks and reinforced earth-walls. The design would include lighting columns and acoustic barriers. The design would be developed within highways land and would require no long-term land take within Riverside Garden Park and little, if any, vegetation removal for construction from this public open space. The North Terminal roundabout improvements would involve a flyover, including the realigned A23 from the South Terminal roundabout to the Longbridge roundabout. The elevated links at the North Terminal grade separated junction would sit approximately 8 metres above the roundabout. The flyover structure would comprise a four span steel beam structure with concrete slab on concrete abutments, piers and retaining walls. The construction of the improvements to the Longbridge roundabout would take place in 2031 and 2032, including removal of highways vegetation and adjacent vegetation adjoining the River Mole and the installation of a temporary footbridge over the River Mole. The works, including the new River Mole bridge and extension to the decked structure of the Brighton Road/A23 London Road segregated left turn lane and creation of two attenuation ponds would be complete by the end of 2032. The implementation of landscape planting proposals is likely to take place following removal of the construction compound between winter 2033 and winter 2034.

Pentagon Field Decked Car Park

8.9.83 Car parking for 5,800 cars in a decked car park structure up to 8 metres high, occupying a footprint of approximately 8.8 hectares would be complete by the start of this phase and planting proposals would be immature. The car park would be enclosed by metal mesh security fencing and column mounted lighting would be erected throughout.

Provision of New Remote Stands

8.9.84 Work to provide new concrete hardstanding to create remote stands in the area known as Oscar and a Code C stand north of the new hangar would be completed during 2031.

Effects on Landscape Character

Gatwick Airport Character Area

8.9.85 Many of the airfield elements of the Project, which were constructed within the initial construction phase between 2024 and 2029 would be operational by 2030. The alterations to the hardstanding associated with the realignment of the northern runway, reconfiguration/modifications of taxiways, holding areas and stands would be in place and would form a relatively minor increase in hardstanding and a decrease in grassland within the airport. The replacement Purple Parking at Crawter's Field would also have been established in the initial construction phase and would represent relatively large areas of hardstanding with security fencing, signage and lighting, introducing a large number of vehicles parked or moving through the areas. The re-engineering of car park X to accommodate the flood compensation area would be complete and would have minimal influence over the character of the airport. Car parks are a typical feature of the airport and an increase in parking would result in an intensification of an existing land use. The relocation of five substations and the removal of two substations would, on balance, create very minimal change within the airport.

8.9.86 Three construction compounds would be operational within this character area throughout this phase of the Project. The loss of green infrastructure in some of these locations and its replacement with the compound and associated activities, including large scale batching plants, would introduce small concentrations of discordant elements into the airport. The ongoing second phase of construction at the CARE facility would initially form a slightly discordant feature in the airport. This would be completed and the facility would be operational by the end of 2030. The completed CARE facility would form a slightly discordant feature within the airport. However, these effects would be partially offset by the removal of disused infrastructure at the existing CARE facility. The CARE facility Option 2 flue location and high-level cranes associated with the North Terminal roundabout improvements are more likely to influence the adjoining landscape of the Open Weald rural landscape than the flue at the CARE Option 1 location and are therefore considered the worst case scenario throughout the PEIR chapter.

8.9.87 The ongoing construction works for the North Terminal baggage handling extension and the surface access improvements would continue to be discordant in nature. The completed South Terminal extension, South Terminal hotel, the new hotel at building compound adjacent to the car rental location and multi-storey car park H and the construction and completion of offices, all of which are adjacent to the South Terminal, would significantly increase the scale and mass of tall buildings within this cluster. The buildings would be prominent within the airport although they would adopt appropriate high quality architecture to ensure the appearance of the building cluster is maintained or enhanced. The loss of mainly surface car parking and low-level buildings of

minimal architectural quality to accommodate the improvements would, however, ensure that, on balance, there would be a neutral effect on character. Existing mature tree and shrub planting around existing car park H would be retained to ensure a high quality setting and visual screen is retained within which to locate extensive new development. The Pentagon Field decked car park would be complete and operational.

8.9.88 The Museum Field and east of Museum Field flood compensation areas and the diversion of the River Mole would be operational. New mitigation planting would be immature and only just starting to soften the engineered landforms to mitigate effects, after a maximum of three years. A public footpath link would be extended south along the River Mole and would form a loop around the Museum Field flood compensation area providing a benefit for the local community.

8.9.89 Improvements to the platforms at ITTS station stops at North and South Terminals would have very limited influence over the established airport character.

8.9.90 The construction phase of the North Terminal and South Terminal roundabout improvements, flyovers and A23 improvements would be ongoing and vegetation clearance work would be required at the Longbridge roundabout. The extensive construction activities would be prominent and discordant within the road corridor and on the edge of the airport and Riverside Garden Park.

8.9.91 The early construction phase of the additional stands south of Pier 7 would require the demolition of existing structures in the area known as Oscar and the creation of a new area of concrete hardstanding. On balance, this would create a slight improvement in the character of this part of the airport.

8.9.92 Temporary lighting would be required to provide a safe and appropriate working environment during the construction phase.

8.9.93 The newly operational elements of the Project would be typical of the existing airport and would provide an intensification of existing character. The construction of large-scale buildings and structures across the airport would result in the greatest direct effect on the character area, however the nature and scale of the developments and construction phase activities would not be completely out of character within an operational airport. Overall there would be a general perception of an increase in the scale and mass of large buildings and structures within the airport and a slight reduction in the extent of green infrastructure. The Gatwick Airport urban character area, within the wider Low Weald landscape of West Sussex, would be of low sensitivity to a medium magnitude of impact. The duration of these effects would range from short to medium term for construction phase effects to long term (permanent) for operational phase effects. Overall, the level of effect would be **minor adverse**, during the day and at night, which would not be significant. However, the operational Pentagon Field decked car park would be located within an open grazed field that is uncharacteristic of the wider airport and would have a medium sensitivity to change. The Project would have a high magnitude of impact and a **major adverse** and significant effect on this particular element of the Gatwick Airport character area.

High Woodland Fringes Character Area

8.9.94 The location of several of the construction elements near the airport boundary would result in effects on the surrounding rural characteristics of the High Woodland Fringes within Crawley District. The operational decked car parking at Pentagon Field would lie adjacent to the rural farmland of the character area. The scale and mass of the structure and earthworks and the

parked and moving vehicles would have an influence over the neighbouring landscape. The lighting on the top deck and vehicle lights would have an influence over the rural character at night. New hedgerow and tree planting located around the perimeter of the Project would be immature and would provide very limited mitigation at this time. The new car park would form an extension of existing airport infrastructure and character, extending the current influence over neighbouring farmland. However, there would be no loss of features or characteristics of the character area. The sensitivity of the High Woodland Fringes to these impacts in this context is low and the magnitude of change would be low, resulting in **minor adverse** effects in the long term during the day and at night, which would not be significant.

8.9.95 The character and activities associated with Gatwick form an established element of the study area and a context for the Project. The characteristic of rural farmland adjacent to an international airport forms part of the character of the area. The sensitivity of the High Woodland Fringes to these activities in this context is low and the magnitude of change would be low, resulting in **minor adverse** effects in the short to long term during the day and at night, which would not be significant.

Upper Mole Farmlands Character Area

8.9.96 The completed noise mitigation feature on the western edge of the airport would have a similar influence over the adjacent landscape character of the Upper Mole Farmlands to the existing situation. Before planting mitigation has matured, the low magnitude impact on the low sensitivity receptor would lead to a **negligible adverse** effect, which would not be significant.

Mole Valley Open Weald Landscape Character Area

8.9.97 The surface access improvements for Longbridge Roundabout, including the satellite contractor compound, would be located within the Mole Valley Open Weald, adjacent to the Church Road Horley conservation area. Vegetation removal around the junction would open up this part of the surface access network. The heavy plant and operations required to undertake the construction works would be prominent within pasture fields and planted road verges on this edge of the character area. This would create a discordant element that has a direct effect on the character area. The edge of the character area would temporarily be considerably changed through loss of grassland, trees and openness to accommodate the construction activities, compound and creation of an attenuation pond. However, this edge of farmland within the wider character area is currently highly influenced by the Longbridge road junction and urban edge of Horley and is considered to be of low sensitivity to this type of change. The high magnitude of direct impact on the field would result locally in a **moderate adverse** effect during the day and at night during construction, which would not be significant. Following completion of the surface access improvements at the Longbridge roundabout the compound would be removed and an attenuation pond created. New hedgerow and tree planting beside the junction and grass seeding and marginal planting associated with the attenuation pond would be immature during this early phase and only just starting to mitigate effects on the fringes of this landscape.

8.9.98 The location of the Museum Field flood compensation area near the airport boundary would result in effects on the surrounding rural characteristics of the Open Weald in the Mole Valley district, although in this location the fields within the Gatwick Airport character area of Crawley District share more characteristics of, and are contiguous with, the Open Weald. The completed features would be located adjacent to the rural farmland of the character area. The developments would have a very limited influence over the neighbouring landscape. The sensitivity of the character

area to these effects in this context is low and the magnitude of change would be low, resulting in **negligible adverse** effects in the long term during the day and at night, which would not be significant.

Low Weald Character Area

8.9.99 The ongoing operation of the contractor compound north of the South Terminal roundabout would continue to have direct effects on the horse paddocks within the rural fringe of Horley. The conspicuous and discordant nature of the activities would have a high magnitude of direct impact on a low sensitivity receptor, resulting in a **moderate adverse** effect during the day and at night in the long term, which would not be significant.

8.9.100 The increase in scale and mass of tall buildings at South Terminal would continue to influence the adjacent landscape of the Low Weald in Reigate and Banstead District.

8.9.101 The removal of highway woodland planting and trees would expose views of the construction activities for the improved South Terminal roundabout at the airport's interface with the Low Weald landscape character area. The heavy plant and operations required to undertake the construction works would be prominent on this edge of the character area. However, this discordant element would lie adjacent to the contractor compound, limiting any influence over the nearby urban fringe fields at Horley. The edge of the character area would continue to be temporarily influenced through green infrastructure loss to accommodate the highways construction. The surface access infrastructure would be complete and operational by the end of this phase. This character area is currently highly influenced by the road corridor and urban edge and is considered, overall, to be of low sensitivity to this type of change. The low magnitude of impact would result in a **minor adverse** effect during the day and at night, which would not be significant.

Effects on Townscape Character

Northgate Crawley Townscape Character Area

8.9.102 During its operation, the main contractor construction compound MA1 would have an influence over the neighbouring Northgate townscape character area of Crawley to the south. The urban character area would be of low sensitivity to a low magnitude of temporary impact in the long term. The level of effect would be **minor adverse** during the day and at night, which would not be significant.

Horley Townscape Character Area

8.9.103 The surface access improvements for Longbridge roundabout would be located partly within the Horley townscape character area within the Church Road Horley conservation area. Vegetation removal around the junction, and particularly on Brighton Road, would open up the junction to the edge of Horley. A strip of woodland approximately 10 metres wide would be removed to accommodate the widened decked structure on Brighton Road. The woodland belt on the edge of Horley is approximately 75 metres wide at this point and the loss of 10 metres would not be sufficient to open up views from residents within the three storey apartments blocks at Longbridge Road. The heavy plant and operations required to undertake the construction works would be prominent within open space and the planted road verge. This would create a discordant element that has a direct effect on the character area. The edge of the character area would temporarily be considerably changed through loss of a limited number of trees and temporary loss of

grassland and openness to accommodate the construction activities and creation of an attenuation pond. This green space on the settlement edge is currently influenced by the Longbridge road junction and is considered to be of medium sensitivity to this type of change. The medium magnitude of direct impact on the open space and influence of further construction activities and compound in the adjacent Open Weald character area would result locally in a **moderate adverse** effect during the day and at night during construction, which would not be significant. Following completion, new hedgerow and tree planting beside the junction and grass seeding and marginal planting associated with the attenuation pond would be immature during this early phase and only just starting to mitigate effects on the fringes of this landscape.

8.9.104 The construction site, activities and compounds for the South Terminal roundabout and North Terminal roundabout would be located near (but outside of) the suburban edge of the character area, resulting in indirect impacts on the townscape. The scale and discordant nature of the activities, including highway vegetation removal and heavy plant movement, would influence a townscape of mainly low sensitivity. A low magnitude of temporary change in the medium term would result in a **negligible adverse** effect, which would not be significant. The surface access improvements would not encroach into the Riverside Garden Park on the edge of Horley and would avoid direct effects and loss of features within this urban green space. The effect on the character of this part of the Horley Townscape character area would be **moderate adverse** during the day and at night, which would not be significant.

Effects on Visual Amenity

Members of Gatwick Staff

8.9.105 The alterations to the hardstanding of the northern runway, reconfiguration/modifications of taxiways, holding areas and stands would form a relatively minor change to views for most members of staff within the airport. The number of Air Traffic Movements (ATMs), including aircraft movements on the ground, as a result of the Project is estimated to increase by up to approximately 5% by 2029. It is highly unlikely that receptors, who currently experience generally low levels of tranquillity, would be able to perceive a 5% increase in aircraft using runways and taxiways at Gatwick. Therefore, it is considered that there would be no readily perceived change to the baseline level of visible/audible aircraft in 2029 (compared to forecast future baseline numbers without the Project) and, therefore, no significant effect is likely. The completion of decked parking at Pentagon Field and replacement Purple Parking at Crawter's Field would form relatively large, although typical, features of the airport and would result in an intensification of an existing land use. The extensions to North and South Terminals, the new hotel at the building compound adjacent to the car rental location, multi-storey car park J and the hotel and multi-storey car parks east of the Hilton Hotel at car park H would introduce further tall buildings within these building clusters. The construction phase and completion of the three office buildings at car park H would be visually discordant initially before adding to the cluster of tall buildings in this area. The completed buildings, although prominent, would be of a high quality architectural design to maintain the appearance of the airport. Existing mature tree and shrub planting around existing car park H would be retained to minimise views of newly built development and reduce the apparent scale and mass of buildings. The ongoing construction of the extension to the baggage reclaim hall at the North Terminal IDL would involve high level cranes and activities that would temporarily be prominent or dominant in some near views and visually discordant in nature. The new native planting on the extended and reconfigured noise mitigation feature would be up to eight years old and would provide additional screening within and into the airport, softening this

large engineered feature. This would form a typical element of the airport and would be no more conspicuous than existing infrastructure. Three construction compounds within the airport and two on the northern edge would be operational, including tall batching plant infrastructure, and would be generally discordant in nature. The relocated substations would create very minimal change within the airport.

8.9.106 The second phase of construction of the CARE facility would continue to form a slightly discordant feature within the airport which would be slightly reduced when complete and operational. The large-scale clearance of woodland planting and mature trees within the A23/M23 corridor to create the surface access improvements would open up views of these prominent activities and ultimately the flyovers and transport infrastructure when complete within this phase. The various flood compensation areas would be complete and initially slightly conspicuous within their predominantly rural fringe locations before planting proposals have matured, although not visible for most people working at Gatwick Airport.

8.9.107 The operational elements of the Project and the construction activities described above would be visible to members of Gatwick staff working in different locations within the airport or using staff car parks and internal access roads. People at their place of work are generally considered to have a low sensitivity to change, particularly given the nature of the change and the context of a busy international airport. The construction activities and completed elements of the Project may be barely perceptible when seen at distance, or prominent and at times dominant when in close proximity. The magnitude of change would range from negligible to medium resulting in **negligible to minor adverse** effects, which would not be significant.

Members of the Public Visiting Gatwick

8.9.108 Some elements of the construction activities and operational elements described in the section above would be visible to members of the public using the airport.

8.9.109 The reconfigured noise mitigation feature and fire training ground, replacement Purple Parking at Crawter's Field, airfield satellite contractor compound and River Mole diversion would be apparent in views from the south side of the airport at the remaining area of Purple Parking. The operational infrastructure would be visible in the context of a busy operational airport, particularly the Boeing hangar directly behind in most views. The northern runway and taxiway, stands and holding area reconfigurations, and the slight increase in aircraft using them, would be barely perceptible. Occupiers of vehicles are receptors of low sensitivity to a low magnitude of change resulting in a **minor adverse** level of effect during the day and at night, which would not be significant.

8.9.110 Members of the public using the airport access roads and car parks would gain some near open views of ongoing construction activities at the CARE facility, North Terminal Long Stay Decked Car Park, North Terminal improvements and initially offices at car park H alongside the completed elements. Completed elements would include multi-storey car park J, South Terminal extension, hotel and multi-storey car park at car park H, new hotel at building compound adjacent to the car rental location, the office buildings (later, when complete) at car park H and activities at the surface access satellite compound at North Terminal. Receptors in one of these locations are represented by Viewpoint 1 at Perimeter Road North. These elements are large scale and, during construction, would also include high level elements such as cranes. The nature and extent of the construction activities would form discordant elements within the existing airport context and the newly completed infrastructure would form an intensification of existing character. Occupiers of

vehicles are receptors of low sensitivity to a medium magnitude of change resulting in a **minor adverse** level of effect during the day and at night, which would not be significant. Pedestrians using public right of way 346/2Sy which follows the roadside pavement on Perimeter Road North are receptors of medium sensitivity and are also represented by Viewpoint 1. Receptors would experience a low magnitude of change leading to a **minor adverse** effect, which would not be significant.

8.9.111 Occupiers of vehicles would gain mid-distance views of the surface access satellite contractor compound (North Terminal) from multi-storey car parks at North Terminal. Occupiers of vehicles are receptors of low sensitivity to a low magnitude of change resulting in a **minor adverse** level of effect during the day and at night, which would not be significant.

8.9.112 Members of the public using the North Terminal buildings and forecourt would gain views of the completed multi-storey car park J and baggage reclaim extension, including high level cranes, and potentially gain glimpses of the other North Terminal extensions in the context of complex airport infrastructure. Receptors are of medium sensitivity to a low magnitude of change resulting in a **minor adverse** effect during the day and at night, which would not be significant.

Walkers Using Public Rights of Way

Public Right of Way 359/Sy Pentagon Field

8.9.113 Receptors in this location are represented by Viewpoint 10. Walkers would gain open, near views of the decked car park, including parked cars and traffic which would completely change the character of a grazed field on the perimeter of the airport. Decked car parks are a typical feature of the airport in views from sections of this footpath and this would result in an intensification of an existing land use within views gained during a journey. Perimeter planting would be immature at this stage, although it would begin to soften and screen views of the Project and partially mitigate effects on views. Walkers are receptors of high sensitivity and would experience a medium magnitude of change, resulting in a **major adverse** effect in the medium term, which would be significant.

Public Right of Way 360/Sy South Terminal

8.9.114 Receptors in this location are represented by Viewpoint 3. Walkers would continue to gain open views of the new hotel in front of the existing multi-storey car park. Walkers are receptors of high sensitivity and would experience a medium magnitude of both adverse and beneficial changes as a result of a larger and more prominent building, although of improved architectural quality, leading to, on balance, a **minor adverse** level of effect during the day and a **negligible adverse** effect at night, in the long term, which would not be significant.

Public Right of Way 362a Horley

8.9.115 Receptors in this location are represented by Viewpoint 8. Open views across a foreground of grazed horse paddock would extend up to the contractor compound for the South Terminal roundabout improvements. Hoardings would define the boundary with large plant and activities visible above and the tall elements of the batching plant particularly prominent against the skyline. Construction activities associated with the South Terminal roundabout and flyover would initially be prominent on the embankment beyond including temporary lighting visible in place of existing columns on the A23 and against the backdrop of lighting at the airport. By the end of this phase the South Terminal roundabout and flyover would be operational and visible at a higher level

beyond, including views of moving traffic using the flyover. Lighting would be visible in place of existing columns on the A23 and against the backdrop of lighting at the airport. New roadside planting, if implemented at this stage, would be immature and would not mitigate effects on views. Walkers are receptors of high sensitivity and would experience a medium magnitude of change resulting in a **moderate adverse** effect during the day and a low magnitude of change and a **minor adverse** effect at night, for the medium to long term, which would not be significant.

River Mole Public Right of Way

8.9.116 Receptors in this location are represented by either Viewpoint 4 or 5. Walkers would continue to gain near, filtered views of the taller elements within the surface access satellite contractor compound at North Terminal, previously described in the assessment for 2024 to 2029. Views south west from Viewpoint 5 may include cranes for the construction of North Terminal long stay decked car park (Phase 2) and the CARE facility building and flue, visible filtered through intervening vegetation. Receptors are of high sensitivity with a negligible magnitude of impact, resulting in **minor adverse** effects, during the day and at night, for the medium term, which would not be significant.

Public Right of Way 574 and Church Meadows Public Open Space Horley

8.9.117 Views across a foreground of mown grassland and scattered trees along the River Mole would include more open views of the Longbridge roundabout due to roadside vegetation removal together with the contractor compound and River Mole bridge improvement works. Large plant and activities would be clearly visible and tall elements of the batching plant above hoardings would be prominent against the skyline. Walkers are receptors of high sensitivity and would experience a medium magnitude of change resulting in a **moderate adverse** effect during the day and a low magnitude of change and a **minor adverse** effect at night, for the short term, which would not be significant. Following completion, new hedgerow and tree planting beside the junction and grass seeding and marginal planting associated with the attenuation pond would be immature during this early phase and only just starting to mitigate effects on views gained by walkers within the conservation area.

New Public Footpath linking Museum Field Water Storage Facility to Public Right of Way 347Sy

8.9.118 The new footpath would introduce a new visual receptor group to the airport. Walkers using this new footpath link would gain a diverse sequence of views of both the naturalistic elements of the land on the fringes of Gatwick and many operational aspects of the airport. The River Mole diversion, the flood compensation area and the landscape of the Open Weald to the west and Gatwick's runways would be visible together with taxiways, car parks on the south side of the airport, the relocated fire training ground, noise barrier and aircraft taking off and landing and using taxiways. Landscape planting proposals for the flood compensation areas in particular would be up to eight years old and would soften and merge these features into the surrounding rural landscape.

Cyclists

National Cycle Route 21

8.9.119 Cyclists using the national cycle route between the A23 and the railway would continue to gain views of the completed hotel at the building compound adjacent to the car rental location and filtered views through vegetation, in winter only, of the tallest elements within the main contractor

compound. Receptors would be of high sensitivity to a low magnitude of change, resulting in a **minor adverse** effect, which would not be significant. Where the cycle route passes beneath the A23 and through Riverside Garden Park it is anticipated that it would be maintained along its existing alignment during the construction phase of the surface access improvements. If the route remains open, receptors in this location are represented by Viewpoint 6. Removal of all highway planting would reveal more open views of the A23 construction activities. The construction site and earth-moving and construction activities would form a large scale and discordant addition to the view. At night the lit corridor would be considerably more prominent in the view against a backdrop of skyglow from the airport. Cyclists are receptors of high sensitivity to a medium magnitude of change in the short term, resulting in a **moderate adverse** effect, during the day and at night, which would not be significant. Visitors to the park on foot are also of high sensitivity to a medium magnitude of change, resulting in a moderate adverse effect during the day and at night, which would not be significant and are also represented by Viewpoint 6.

Occupiers of Residential Properties

Horley Residential Edge

8.9.120 Receptors in this location are represented by Viewpoint 7. Highway planting within the A23 corridor would be removed to accommodate the surface access improvements. Trees and vegetation within Riverside Garden Park would be retained. Removal of highway screening vegetation would reveal some filtered views of the A23 North Terminal and South Terminal roundabouts construction activities through retained vegetation within the park and also garden vegetation and fences within a range of nearby properties on several roads on the fringes of Horley including:

- approximately 40 properties on The Crescent;
- approximately 30 properties on Riverside;
- two properties on Woodroyd Gardens;
- four properties on Cheyne Walk;
- 15 properties on Longbridge Road; and
- four first floor and four second floor apartments of two blocks of three story buildings on Longbridge Road.

8.9.121 The South Terminal and North Terminal roundabout construction site and earth-moving and construction activities would form a discordant addition to the view, visible through vegetation. The degree of visibility of these activities would depend largely on the amount of vegetation in Riverside Garden Park and tree and shrub vegetation within the gardens of properties. At night the lit corridor of works would be visible, filtered through vegetation against a backdrop of skyglow from the airport. Receptors at many properties listed above are unlikely to experience a perceptible change in view in the summer due to the screening properties of intervening vegetation when in leaf. The levels of effect defined below relate predominantly to winter views as a worst case. Occupiers of residential properties are receptors of high sensitivity to a generally negligible magnitude of change in the medium term, resulting in a **minor adverse** effect, during the day and at night, which would not be significant.

Occupiers of Commercial Properties

Premier Inn

8.9.122 Occupiers of the Premier Inn Hotel at North Terminal would gain similar views to those described above at the neighbouring multi-storey car park. Occupiers of rooms in west facing locations would gain oblique views of the North Terminal extension works and completed elements. Occupiers of hotel rooms are receptors of medium sensitivity to a low magnitude of change resulting in a **minor adverse** effect during the day and at night, which would not be significant.

8.9.123 Occupiers of a second Premier Inn Hotel adjacent to staff car park Y would gain near views filtered through intervening trees, in winter only, of the surface access satellite contractor compound at North Terminal. The activities to create and operate the compound would be discordant in the view, for a medium-term duration. Occupiers of rooms in south west facing locations would gain mid-distance views of the North Terminal extension works and completed elements. Occupiers of hotel rooms are receptors of medium sensitivity to a medium to low magnitude of change resulting in a **moderate to minor adverse** level of effect during the day and at night, which would not be significant.

Hilton Hotel

8.9.124 Occupiers of rooms on the east facing elevation of the Hilton Hotel would initially gain near, open views of the extensive construction site and activities for the South Terminal hotel, offices and multi-storey car park H (Phase 2) in the context of the previously completed phases of the car park and hotel. The scale and nature of the activities would be discordant and dominant in most views. Receptors would be of medium sensitivity to a high magnitude of change in the medium term, resulting in a **major adverse** effect during the day and at night, which would be significant. When complete, the new developments would form an extension of the cluster of buildings at South Terminal. Open views of the existing car park and surrounding trees would be replaced by large scale tall buildings in close proximity that would obscure views. The completed buildings, although dominant in views, would be of an appropriate architectural design to maintain the appearance and quality of the airport. Receptors would experience a high magnitude of change in the long term, resulting in a **moderate adverse** effect during the day and at night, which would not be significant.

Travelodge

8.9.125 Occupiers of south east facing rooms would gain partially filtered, relatively near views through boundary vegetation in the winter of the surface access satellite contractor compound at North Terminal. Occupiers of hotel rooms are receptors of medium sensitivity to a low magnitude of change, depending on the season, resulting in a **minor adverse** level of effect during the day and at night, which would not be significant.

Members of the Public Using the McDonalds and KFC at South Terminal

8.9.126 The previous clearance of the majority of woodland planting and mature trees to the south of the A23 as part of the initial works to improve the South Terminal roundabout and to create the flyover would reduce the extent of screening vegetation and open up views of the construction activities initially. The activities would be prominent and discordant in close proximity to receptors, particularly in the winter when vegetation is not in leaf. By the end of the phase the completed South Terminal roundabout, A23 flyover and traffic would form prominent elements of high-level

transport infrastructure, partially visible through a narrow strip of retained planting in the summer, with more open views in the winter when vegetation is not in leaf. The Project, including moving traffic and lighting would be prominent in close proximity to receptors. Receptors at north facing windows and outdoor spaces would be of medium sensitivity in the short to medium term. The magnitude of impact would be medium, leading to **moderate adverse** effects during the day and at night, which would not be significant.

Roband Electronics

8.9.127 The noise mitigation feature would be visible in near, open views gained by people at their place or work immediately adjacent to the airport. By the end of this phase new tree and shrub planting up to eight years old would help to blend the engineered feature into the surroundings. Occupiers of the property are receptors of low sensitivity to a low magnitude of change resulting in a **minor adverse** level of effect during the day and at night, which would not be significant.

Meadowcroft House

8.9.128 Receptors would gain filtered views through boundary vegetation of the contractor compound for the South Terminal roundabout improvements. Large plant and activities would be visible above hoardings whilst the batching plant would be more prominent against the skyline. Construction activities associated with the South Terminal roundabout and flyover would initially be visible beyond, through vegetation. Temporary lighting would be visible in place of existing columns on the A23 and against the backdrop of lighting at the airport. By the end of the phase the completed flyover, infrastructure and traffic using the road would be prominent in the view. People at their place of work are receptors of low sensitivity and would experience a medium magnitude of change resulting in a **minor adverse** effect, during the day and at night, for the medium term, which would not be significant.

Occupiers of the Amadeus Building and Schlumberger House Commercial Properties at South Terminal

8.9.129 Initially the South Terminal roundabout and flyover construction activities, followed by the completed scheme and traffic, visible due to previous vegetation clearance would change views for people at their place of work in the Amadeus building and Schlumberger House. Receptors at north facing windows and outdoor spaces would be of low sensitivity in the short to medium term. The magnitude of impact would be medium, leading to **minor adverse** effects during the day and at night, which would not be significant.

Occupiers of Vehicles and Trains

A23

8.9.130 Occupiers of vehicles travelling along the A23/M23 would pass through the construction works for the South Terminal roundabout and North Terminal roundabout in 2030 and the North Terminal roundabout and Longbridge roundabout in 2031 to 2032. Receptors would gain open views revealed by the vegetation clearance activities. Existing infrastructure and buildings within the airport would be visible with the associated South Terminal surface access contractor compound immediately to the north, changing the largely green backdrop to the busy road corridor. The scale and nature of the construction activities would be prominent and at times dominant in views. As the construction works progress the South Terminal roundabout improvements would be completed within this phase. Occupiers of vehicles would be of low sensitivity to a high magnitude

of change, leading to a **moderate adverse** effect during the day and at night in the short to medium term, which would not be significant.

Lowfield Heath Road

8.9.131 As the proposed planting on the reconfigured and realigned noise mitigation feature becomes established after a period of up to eight years, it would have a similar appearance to the existing feature near Lowfield Heath Road, becoming a wall feature as it extends north east into the airport. The low sensitivity receptors would experience a low magnitude of change and a **negligible adverse** effect during the day and at night, which would not be significant.

Balcombe Road

8.9.132 Receptors in this location are represented by Viewpoint 9. The completed decked parking at Pentagon Field would include large-scale concrete and steel structures with signage and lighting surrounded by a security fence. The car park would completely change the character of a grazed field on the perimeter of the airport. However, the roadside hedgerow would be retained and, if maintained to a higher level and supplemented with additional tree planting, would partially screen or soften some views of the new development. Decked car parks are a typical feature of the airport and would result in an intensification of an existing land use within views from the road. Occupiers of vehicles are receptors of low sensitivity to a high magnitude of change resulting in a **moderate adverse** level of effect during the day and at night, which would not be significant.

8.9.133 Pedestrians using the roadside pavement are of medium sensitivity in this location. There would be a high magnitude of change resulting in a **major adverse** level of effect during the day and at night, which would be significant.

Ifield Road

8.9.134 Receptors in this location are represented by Viewpoint 13. The reconfigured northern runway, reconfiguration/modifications of taxiways and the noise mitigation feature would be barely perceptible in views through gaps in the roadside hedgerow. Occupiers of vehicles are receptors of low sensitivity to a negligible magnitude of change resulting in a **negligible adverse** effect during the day and at night, which would not be significant.

Railway

8.9.135 Occupiers of trains on the railway would continue to gain brief, filtered views west through vegetation in winter only of the tallest elements within the main contractor construction compound and of the completed hotel at the building compound adjacent to the car rental location. In these locations passengers would be of low sensitivity to a negligible magnitude of change, resulting in a **negligible adverse** effect, which would not be significant. Near and relatively open views east of the South Terminal roundabout and flyover construction activities and associated contractor compound would be visible on the northern edge of the airport. Views of the highway construction would be revealed through the removal of roadside vegetation. The activities and compound would form large scale discordant additions to the views in the short to medium term. The magnitude of change would be high, resulting in **minor to moderate adverse** effects during the day and at night, which would not be significant.

Mid to Long Distance Views

8.9.136 Mid to long distance views from the surrounding landscape may include tall buildings or high level construction activities such as cranes in several locations. These would form recognisable or barely perceptible additions, some slightly discordant in nature that, if visible, would be seen above intervening tree tops and within areas of existing built development at the airport. These types of views may be gained by medium to high sensitivity receptors at Viewpoint 12 at Rowley Farm bridleway, Viewpoint 13 at Lowfield Heath Road, at Viewpoint 14 on the Sussex Border Path east of Charlwood, Viewpoint 15 at Norwood Hill, Viewpoint 16 at Turners Hill and Viewpoint 17 at Tilgate Hill. The change in view would be no more than negligible, leading to **negligible to minor adverse** effects in the medium term, during the day and at night, which would not be significant.

8.9.137 The slight increase in aircraft using realigned and reconfigured runways and taxiways at Gatwick would be barely perceptible. Therefore, it is considered that there would be no readily discernible change to the existing baseline level of visible or audible aircraft in 2030 to 2032 and, therefore, no significant effect.

Significance of Effects

8.9.138 No further mitigation or monitoring is required and therefore the significance of effects would remain as presented above. However, planting proposals would be included in many of the elements of the Project design. In 2030, the planting would be in place, but it would be immature and would not have reached its intended design year. In time, as mitigation planting matures, the level of effect on visual receptors is likely to reduce.

Effects on Tranquillity within Nationally Designated Landscapes

8.9.139 The number of overflights within the study area as a result of the Project is estimated to increase by up to approximately 5% by 2030 to 2032. It is highly unlikely that receptors would be able to perceive a 5% increase in overflying aircraft within the study area. Therefore, it is considered that high sensitivity receptors would experience a negligible magnitude of change, resulting in no more than a **Negligible adverse** effect (compared to forecast future baseline numbers without the Project), which is not significant.

2033-2038

8.9.140 This section describes the effects that would arise as a result of a small number of ongoing construction activities occurring during 2033 to 2038 and the mainly operational activities associated with this assessment year period. The latter includes the elements of the Project assessed within the previous sections for 2024 to 2029 and 2030 to 2032. Key effects are summarised in table format in the summary section at the end of the chapter (see Table 8.13.1).

8.9.141 A summary of the maximum design scenario dimensions required for the construction of the following elements of the Project is provided in Table 8.7.1. Further detail relevant to this section of the assessment is provided below.

Hangar

8.9.142 A new hangar located north of Larkins Road is anticipated to be complete by the end of 2033. The building would be up to 32 metres high with a footprint of approximately 12,440 m^2.

Internal Access

8.9.143 The Larkins Road diversion (Phase 2) and provision of autonomous vehicles stations at North and South Terminals would be completed and operational by 2034.

Pier 7

8.9.144 The construction of Pier 7 would be completed in 2034. This would be a steel portal frame and concrete building with ground floor plus two levels up to 18 metres high and concrete apron up to 10.1 hectares.

Multi-Storey Car Park Y

8.9.145 Phase 2 construction of the multi-storey car park Y would be undertaken in 2034, for completion in 2035. This would provide 4,000 spaces and a footprint of 1.9 hectares.

Gatwick Stream Flood Compensation

8.9.146 An area of 18,000 m^2 and up to approximately 3 metres deep within an area of three grass fields partly defined by trees and hedgerows, connected to the Gatwick Stream by a spillway.

Contractor Compounds: MA1, Airfield Satellite, North Terminal and South Terminal and Longbridge Roundabout

8.9.147 Completion of activities and restoration of compounds to existing land uses. An attenuation pond would be incorporated into the restoration proposals at the Longbridge Roundabout.

Effects on Landscape Character

Gatwick Airport Character Area

8.9.148 All of the elements of the Project constructed within the first phases of development would now be operational. The alterations to the hardstanding of the northern runway, reconfiguration/ modifications of taxiways, holding areas and stands would be as set out for 2024 to 2032, forming a relatively minor increase in hardstanding and a decrease in grassland within the airport compared to the existing baseline. The replacement Purple Parking at Crawter's Field would also have resulted in an intensification of an existing land use. The completion and operation of the North Terminal extensions would form large scale additions to tall buildings that would be prominent within the airport, although they would adopt appropriate high quality architecture to ensure the appearance of the building cluster is maintained or enhanced ensuring that, on balance, there would be a neutral effect on character. The five relocated substations would create very minimal change within the airport. The completion of the improved South Terminal and North Terminal roundabouts and new flyovers would introduce large scale concrete structures, steep retained earthworks and widened carriageways with associated lighting columns. The Project would considerably change the transport corridor and influence the airport edge. The completed Longbridge roundabout would be a relatively low key improvement to the existing junction arrangement. The appropriate use of high quality structures and landscape planting treatments to integrate the new infrastructure with its surroundings would ensure the appearance of the road corridor is, on balance, maintained in the long term.

8.9.149 The main contractor compound, surface access satellite compounds (airfield, South Terminal roundabout and North Terminal roundabout) would continue to be operational up to the end of 2035, forming conspicuous and large-scale additions to the character area. The completed CARE

facility would form a slightly discordant feature within the airport. However, these effects would be partially offset by the removal of disused infrastructure at the existing CARE facility. Replacement and new perimeter tree and shrub planting would be up to eight years old by 2038 and would begin to soften and screen the main elements of the CARE facility within the wider airport context. The CARE facility Option 2 flue location and high-level cranes within the North Terminal roundabout improvements are more likely to influence the adjoining landscape of the Open Weald rural landscape than the flue at the CARE Option 1 location. The operational flood compensation areas and River Mole diversion would form low key additions to the airport that would reflect the rural fringe character of their immediate settings. The mitigation landscape scheme of native habitats would be approximately 13 years old by the end of this phase and would have begun to achieve its intended design function, merging with the surroundings and softening the engineered features, providing beneficial effects to offset any remaining adverse effects. The public footpath link extending south along the River Mole and looping around the Museum Field flood compensation area would provide a long term benefit for the local community.

8.9.150 The operational South Terminal extension, South Terminal hotel, the new hotel at the building compound adjacent to the car rental location, office buildings and multi-storey car park H adjacent to the South Terminal would significantly increase the scale and mass of tall buildings within this cluster. The buildings would be prominent within the airport, although they would adopt appropriate high quality architecture to ensure the appearance of the building cluster is maintained or enhanced. The loss of mainly surface car parking and low-level buildings of minimal architectural quality to accommodate the improvements would, however, ensure that, on balance, there would be a neutral effect on character. Existing mature tree and shrub planting around existing car park H would be retained to ensure a high quality setting and visual screen is retained within which to locate extensive new development. Additional landscape planting proposals would be up to approximately 10 years old and would contribute to the high quality scheme of external spaces.

8.9.151 The operational decked car park at Pentagon Field would continue to form a large scale and prominent addition to the landscape on the edge of the airport. The change from grazed field to large scale infrastructure, traffic, lighting and signage would be prominent. The perimeter planting proposals would be up to eight years old by the end of this phase and would help to merge the proposals with the surrounding hedgerows and woodland on the edge of the airport and filter views of the development, reducing its apparent scale and mass.

8.9.152 The completion and operation in 2034 of the Pier 7 building and concrete hardstanding would require the demolition of existing structures in the area known as Oscar. On balance, this would create a slight improvement in the character of this part of the airport. Temporary lighting would be required to provide a safe and appropriate working environment during the limited parts of the Project remaining under construction.

8.9.153 The newly operational elements of the Project would be typical of the existing airport and would provide an intensification of existing character. The final phase of construction of large-scale buildings and structures across the airport would result in a temporary direct effect on the character area, however the nature and scale of the developments and construction phase activities would not be completely out of character within an operational airport. Overall, there would be a general perception of an increase in the scale and mass of large buildings and structures within the airport and a slight reduction in the extent of green infrastructure. The Gatwick Airport urban character area, within the wider Low Weald landscape of West Sussex,

would be of low sensitivity to a medium magnitude of impact. The duration of these effects would range from short to medium term for construction phase effects to long term (permanent) for operational phase effects. Overall, the level of effect would be **minor adverse**, during the day and at night, which would not be significant. However, the operational Pentagon Field decked car park would be located within an open grazed field that is uncharacteristic of the wider airport and would have a medium sensitivity to change. The Project would continue to have a high magnitude of impact and a **major adverse** and significant effect on this particular element of the Gatwick Airport character area.

High Woodland Fringes Character Area

8.9.154 The decked car parking at Pentagon Field would lie adjacent to the rural farmland of the character area. The scale and mass of the structure and the parked and moving vehicles would have an influence over the neighbouring landscape. The lighting on the top deck and vehicle lights would have an influence over the rural character at night. New hedgerow and tree planting located around the perimeter of the Project would be reaching maturity and would provide some mitigation at this time. The new car park would form an extension of existing airport infrastructure and character, extending the current influence over neighbouring farmland. However, there would be no loss of features or characteristics of the character area. The sensitivity of the High Woodland Fringes to these impacts in this context is low and the magnitude of change would be low, resulting in **minor adverse** effects in the long term during the day and at night, which would not be significant.

Upper Mole Farmlands Character Area

8.9.155 The completed noise mitigation feature with mature native planting established on the western edge of the airport would continue to have negligible effects on the adjoining rural character area in the long term.

8.9.156 The replacement Purple Parking at Crawter's Field would lie adjacent to the Upper Mole Farmlands character area. Some tree clearance, new hardstanding, security fencing, signage, lighting and cars would influence the rural character of the neighbouring landscape, although the retention of existing woodland adjacent to the airport perimeter fence would ensure that effects are minimised. Car parks are a typical feature of the airport in this location and would extend and intensify an existing influence. The sensitivity of the character area to these effects in this context is low and the magnitude of change would be low, resulting in **negligible adverse** effects in the long term during the day and at night, which would not be significant.

Mole Valley Open Weald Character Area

8.9.157 The construction activities at the Longbridge Roundabout contractor compound would extend into the early part of this phase and would have a direct, temporary effect on the landscape on the edge of Horley until the end of 2033. The conspicuous and discordant nature of the activities would have a high magnitude of direct impact on a low sensitivity receptor, resulting in a **moderate adverse** effect during the day and at night in the long term, which would not be significant. The landscape planting proposals associated with the Longbridge roundabout and attenuation feature would be newly established and no more than four years old and would provide some beneficial impacts to partially offset any adverse effects on the character of the field or influence over the neighbouring open space and conservation area. Following completion of the surface access improvements at Longbridge the compound would be removed and the

grassland reinstated. The low sensitivity character area and low magnitude of beneficial and adverse effects would, in the long term, result in **neutral** effects.

8.9.158 The operational flood compensation areas at Museum Fields and the River Mole diversion, due to their low key nature and established landscape planting and grassland seeding proposals, would have limited influence over the character of the neighbouring rural area.

8.9.159 The top of the new hangar on the north-west side of the airport may be intervisible with this neighbouring landscape, in the context of other existing, similar elements of development at the airport.

8.9.160 The sensitivity of the character area to these effects in this context is low and the magnitude of change would be low, resulting in **negligible adverse** effects in the medium to long term during the day and at night, which would not be significant.

Low Weald Character Area

8.9.161 The ongoing operation until the end of 2035 of the surface access contractor compound north of the South Terminal roundabout would continue to have a high magnitude of direct impact on a low sensitivity receptor, resulting in **moderate adverse** effects on the horse paddocks of the rural fringe of Horley during the day and at night, which would not be significant. Following completion of the surface access improvements the compound would be removed and the grassland reinstated. The long term direct effect on the character area would be neutral.

8.9.162 The new hotels, offices and multi-storey car parks at South Terminal would increase the scale and mass of tall buildings within this cluster. This increase in development would intensify the existing influence that buildings at South Terminal have over the adjacent landscape of the Low Weald in Reigate and Banstead District.

8.9.163 The operational South Terminal roundabout and flyover structure would change the character of the A23/M23 transport corridor in this location beyond the edge of the Low Weald character area. The removal of the majority of existing highway woodland planting and trees and introduction of large-scale concrete structures, steep retained earthworks and widened carriageways with associated lighting columns would intensify development in this location and place moving traffic at a higher level within the adjacent character area. The character area is considered to be of low sensitivity to these types of changes. The medium magnitude of impact would result in a **minor adverse** effect during the day and at night, which would not be significant. By the end of this phase new highway planting would be up to six years old and would start to screen and soften the large scale engineered structures and traffic movement, particularly during the summer when in leaf.

Effects on Townscape Character

Northgate Crawley Townscape Character Area

8.9.164 The main contractor construction compound MA1 would continue to have an influence over the neighbouring Northgate townscape character area until its removal in 2035. The urban character area would be of low sensitivity to a low impact in the long term. The level of effect would be **minor adverse** during the day and at night, which would not be significant.

Horley Townscape Character Area

8.9.165 The landscape planting proposals associated with the Longbridge roundabout and attenuation feature would be immature four years after implementation and would partially offset adverse effects on the character of the open space and conservation area. The low sensitivity of the character area to these changes and low magnitude of beneficial and adverse impacts would, in the long term, result in **neutral** effects.

8.9.166 The North Terminal roundabout and surface access improvements would be operational immediately adjacent to the public open space of Riverside Garden Park on the edge of this townscape character area. The Riverside Garden Park is of medium sensitivity to a low magnitude of change in the long term, resulting in **minor adverse** effects during the day and at night, which would not be significant. By the end of this phase new highway planting would be up to six years old and would start to screen and soften the large scale engineered structures and traffic movement, particularly during the summer when in leaf.

8.9.167 The urban edge of Horley would not be directly affected by the North Terminal roundabout or other highway improvements. However, the loss of vegetation and the large scale engineered structures in close proximity to the residential district would have an adverse influence over it. The majority of the character area is of low sensitivity to this type of effect. The magnitude of change would be low and the level of effect during the day and night time would be **negligible adverse**, which would not be significant.

Effects on Visual Amenity

Members of Gatwick Staff

8.9.168 The alterations to the hardstanding of the northern runway, reconfiguration/modifications of taxiways, holding areas and stands, relocated substations and operational surface water management features would continue to form a relatively minor change to views for most members of staff within the airport, previously described in 2030 to 2032. The number of ATMs, including aircraft movements on the ground, as a result of the Project is estimated to increase by up to approximately 20% by the end of 2032 and would remain at this level during 2033 to 2038. Aircraft currently form a regular visible or audible feature that forms a slightly discordant aspect within the airport. An increase of aircraft may be discernible to some observers or barely perceptible as an increase to other observers and not significant. Some people may be unable to perceive the increase in the number of aircraft and would therefore experience no discernible effect. The replacement surface parking (Purple Parking) at Crawter's Field would continue to form a relatively large, although typical, feature of the airport. The extension and reconfiguration of the noise mitigation feature and the relocated fire training ground would also form typical elements of the airport and would be no more conspicuous than existing infrastructure. The MA1 main contractor compound, North Terminal satellite contractor compound and Airfield satellite contractor compound would continue to form discordant and at times prominent features within the airport until their removal in 2035.

8.9.169 The operational South Terminal roundabout and flyover, including moving traffic, would be prominent in views from locations on the northern edge of the airport and more apparent than the existing road due to earlier vegetation removal and the raised level of the flyover. New planting would be up to six years old at the end of this phase and would start to mitigate visual effects. The North Terminal roundabout, flyover and A23 improvements would form a large scale and

prominent addition to the edge of the airport. Views from the edge of the airport that would initially be opened up through the large-scale removal of mature highway planting would start to be filtered and screened by new planting.

8.9.170 The North Terminal extensions would form large scale additions to existing tall buildings that, whilst visually prominent, would be of a high quality design to merge with existing buildings within the cluster.

8.9.171 The completed new hangar north of Larkins Road would form a large scale, visually prominent element in the western part of the airport. The building would be dominant in near open views from roads and hardstanding in the long term. The building would have a similar appearance in terms of scale, form and materials to the nearby Boeing hangar and would be characteristic of the airport.

8.9.172 The South Terminal extension, South Terminal hotel, the hotel at the building compound at the car rental location, office buildings and multi-storey car park H adjacent to the South Terminal would introduce further tall buildings within this cluster. The new buildings, although prominent, would be of a high quality architectural design to maintain the appearance of the airport. Existing mature tree and shrub planting around existing car park H would be retained to minimise views of built development and reduce the apparent scale and mass of buildings. New tree and shrub planting within external spaces would form an attractive setting for these buildings.

8.9.173 The North Terminal Long Stay decked car park would introduce large scale structures into the airport, currently occupied by surface parking. The scale and mass of the decked car park would form a prominent addition to near views and to the back drop of more distant views across the airport. New perimeter tree and shrub planting would be up to six years old and would soften and screen the base of the structure within the airport context.

8.9.174 The Pentagon Field decked car park would form a large scale and visually prominent structure that would extend and intensify existing areas of car parking within the airport. Perimeter planting proposals would be up to nine years old and relatively well established. The vegetation would screen and filter views of the decked structure and soften its appearance on the edge of the airport.

8.9.175 The operational elements of the Project and the final stages of some construction activities described above would be visible to members of Gatwick staff working in different locations within the airport or using staff car parks and internal access roads. People at their place of work are generally considered to have a low sensitivity to change, particularly given the nature of the change and the context of a busy international airport. The elements of the construction activities and the larger operational developments may be barely perceptible when seen at distance, or prominent and at times dominant when in close proximity. The magnitude of change would range from negligible to high resulting in **negligible to moderate adverse** effects, which would not be significant.

Members of the Public Visiting Gatwick

8.9.176 The reconfigured noise mitigation feature and fire training ground, replacement Purple Parking at Crawter's Field and airfield satellite contractor compound would continue to be apparent in views from the south side of the airport at Purple Parking, previously described in 2030 to 2032. The operational northern runway and taxiway reconfigurations would continue to be barely

perceptible. Occupiers of vehicles are receptors of low sensitivity to a low magnitude of change resulting in a **minor adverse** level of effect during the day and at night, which would not be significant.

8.9.177 Members of the public using the airport access roads and North Terminal long stay surface car parks would gain some near open views of ongoing construction activities at the surface access satellite compound at North Terminal and operational CARE facility, multi-storey car park J, the various elements of the North Terminal extension, the hangar north of Larkins Road, South Terminal extension, South Terminal hotel, the hotel at the building compound at the car rental location, office buildings, multi-storey car park H adjacent to the South Terminal, North Terminal long stay decked car park, the North Terminal roundabout and flyover. These elements of the Project would introduce further tall buildings and structures, generally in close proximity to existing building clusters. Receptors in one of these locations are represented by Viewpoint 1 at Perimeter Road North. These developments are large scale and prominent. The nature and extent of these developments would form prominent and at times dominant elements within the existing and future baseline airport context. Occupiers of vehicles are receptors of low sensitivity to a medium to high magnitude of change resulting in a **minor or moderate adverse** level of effect during the day and at night, which would not be significant. Pedestrians using public right of way 346/2Sy are receptors of medium sensitivity, also represented by Viewpoint 1, and would continue to experience **minor adverse** effects, which would not be significant.

8.9.178 Occupiers of vehicles at North Terminal multi-storey car parks are of low sensitivity and would continue to gain views of the surface access satellite compound, previously described in 2030 to 2032. The low magnitude of change would result in a **minor adverse** level of effect during the day and at night, which would not be significant. Following completion of the surface access improvements the compound would be removed. The long term effect on views would be neutral.

8.9.179 Occupiers of west facing locations in the Premier Inn Hotel at North Terminal would gain views of the completed North Terminal extensions as minor intensifications of the existing building cluster. Receptors would be of medium sensitivity to a negligible magnitude of change in the long term, resulting in a **negligible adverse** effect during the day and at night, which would not be significant.

8.9.180 Members of the public using the North Terminal buildings and forecourt would potentially gain glimpses of the terminal extensions as minor additions to the complex airport infrastructure. Receptors are of medium sensitivity to a negligible magnitude of change resulting in a **minor adverse** effect in the long term, during the day and at night, which would not be significant.

Walkers using Public Rights of Way

River Mole Public Right of Way

8.9.181 Receptors in this location are represented by either Viewpoint 4 or 5. Walkers would continue to gain near, filtered views of the taller elements within the surface access satellite contractor compound at North Terminal up to the end of 2035, previously described in 2030 to 2032. Views south west from Viewpoint 5 may include the CARE facility Option 2 building and flue, visible filtered through intervening vegetation in winter only. Receptors are of high sensitivity to a negligible magnitude of impact, resulting in **minor adverse** effects, during the day and at night, for the medium term, which would not be significant.

Public Right of Way 359/Sy Pentagon Field

8.9.182 Receptors in this location are represented by Viewpoint 10. Walkers would gain open, near views of the large scale, decked car park, including parked cars and traffic. The car park would completely change the character of an open, grazed field on the perimeter of the airport, obscuring views beyond. Car parks, including decked car parks, are a typical feature of the airport in views from sections of this footpath and would result in an intensification of an existing land use within views gained during a journey. Perimeter planting including native trees and shrubs would be up to nine years old and relatively well established by the end of this phase. The new vegetation would, in summer in particular when in leaf, make a significant contribution to the mitigation of effects on views. Walkers are receptors of high sensitivity and would experience a medium magnitude of change. On balance, when considering the beneficial effects of new planting in combination with the adverse effects of development the effect would be **moderate adverse** in the long term during the day and at night, which would not be significant.

Public Right of Way 360/Sy South Terminal

8.9.183 Receptors at Viewpoint 3 would continue to gain open views of the new hotel in front of the existing multi-storey car park. Walkers are receptors of high sensitivity and would experience a medium magnitude of both adverse and beneficial changes leading to, on balance, a **minor adverse** level of effect during the day and a **negligible adverse** effect at night, in the long term, which would not be significant.

Public Right of Way 360/1Sy Tinsley Green

8.9.184 Receptors in this location are represented by Viewpoint 11. Walkers would gain narrow open near views and filtered views of the earth moving activities required to construct the Gatwick Stream flood compensation area and the completed facility. Some existing tree and shrub vegetation would be removed to accommodate the works, although most would be retained. Views would be gained with a glimpsed backdrop of existing flood compensation land and infrastructure at Crawley Sewage Treatment Works. Walkers are receptors of high sensitivity and would experience a low magnitude of change, resulting in a **moderate adverse** effect in the medium to long term, which would not be significant.

Public Right of Way 362a Horley

8.9.185 Receptors in this location are represented by Viewpoint 8. Walkers would continue to gain open views to the contractor compound for the South Terminal roundabout previously described in 2030 to 2032, until the removal of the compound by the end of 2035. The South Terminal roundabout and flyover would now be operational and visible at a higher level beyond, including moving traffic. Lighting would be visible in place of existing columns on the A23 and against the backdrop of lighting at the airport. Walkers are receptors of high sensitivity and during the use of the construction compound would temporarily experience a medium magnitude of change resulting in a **moderate adverse** effect, during the day and a low magnitude of change and a **minor adverse** effect at night, for the short term, which would not be significant. When the construction compound is removed and the land restored to grazing paddocks the surface access improvements would result in a long term low magnitude of change and a **minor adverse** effect in the day and a negligible magnitude of change and a **negligible adverse** effect at night, which is not significant.

New Public Footpath linking Museum Field Water Storage Facility to Public Right of Way 347Sy

8.9.186 Walkers using this new footpath link would continue to gain a view of operational aspects of the airport in the naturalistic context of the land on the fringes of Gatwick. The River Mole diversion, flood compensation areas, taxiways, car parks, relocated fire training ground, noise barrier and aircraft taking off and landing and using taxiways would be visible within the context of landscape planting proposals that would be up to 14 years old. The mature planting would offer significant mitigation of visual effects and would integrate these features into the surrounding rural landscape.

Public Right of Way 574 and Church Meadows Public Open Space Horley

8.9.187 Following completion of the surface access improvements at the Longbridge roundabout in 2032 and the removal of the construction compound in 2033 new hedgerow and tree planting beside the junction and grass seeding and marginal planting associated with the attenuation pond would be up to four years old and would partially filter and screen views of the junction arrangement and soften the attenuation feature, providing greater visual and ecological diversity within this open space. Walkers are receptors of high sensitivity and would experience a low magnitude of both adverse and beneficial changes resulting in, on balance, a **negligible** adverse effect during the day and at night, for the long term, which would not be significant.

Cyclists

National Cycle Route 21

8.9.188 Cyclists using the national cycle route between the A23 and the railway would continue to gain filtered views through vegetation, in winter only, of the tallest elements within the main contractor compound and the new hotel at the building compound at the car rental location, up to 2035, as previously described in 2030 to 2032, leading to **minor adverse** effects, which would not be significant. Where the cycle route passes beneath the A23 and through Riverside Garden Park it is anticipated that it would be maintained along its existing alignment during the construction phase of the surface access improvements. If the route remains open, receptors in this location are represented by Viewpoint 6. Removal of all highway vegetation would reveal more open views of the A23 and traffic when operational. At night the lit corridor would be slightly more prominent in the view against a backdrop of skyglow from the airport. Cyclists are receptors of high sensitivity to a medium magnitude of change in the short term, resulting in a **moderate adverse** effect, during the day and at night, which would not be significant. Visitors to the park on foot would experience the same level of effect. New highway planting would be up to six years old and not mature, providing limited screening.

Occupiers of Commercial Properties

Premier Inn

8.9.189 Occupiers of the Premier Inn Hotel adjacent to staff car park Y would continue to gain near views through boundary vegetation, mainly in winter, of the surface access satellite contractor compound at North Terminal including 15 metre high batching plant up to 2035, resulting in **moderate adverse** effects during the day and at night. Occupiers of hotel rooms facing south west towards the North Terminal extensions would experience a negligible magnitude of change resulting in a **negligible adverse** level of effect during the day and at night, which would not be significant.

Hilton Hotel

8.9.190 Occupiers of rooms on the east facing elevation of the Hilton Hotel would continue to gain views of the completed South Terminal Hotel offices and multi-storey car park H. The completed buildings, although dominant in views, would be of an appropriate architectural design to maintain the appearance and quality of the airport. Landscape planting proposals would be up to seven years old and would contribute to the overall quality and character of the new development, softening views of the architecture and external spaces. Medium sensitivity receptors would experience a high magnitude of change in the long term, resulting in a **moderate adverse** effect during the day and at night, which would not be significant.

Travelodge

8.9.191 Occupiers of south east facing rooms would continue to gain views of the surface access satellite contractor compound at North Terminal until 2035 before it is decommissioned, leading to a **moderate to minor adverse** level of effect during the day and at night, which would not be significant.

Members of the Public Using the McDonalds and KFC at South Terminal

8.9.192 The operational South Terminal roundabout and A23 flyover would continue to form partially visible elements of high-level transport infrastructure, filtered through retained vegetation and some additional new planting up to six years old by the end of this phase. Summer views are likely to be limited to lighting columns and tops of signage and tall vehicles. Receptors at north facing windows and outdoor spaces would be of medium sensitivity. The magnitude of impact would be low, leading to **minor adverse** effects in the long term during the day and at night, which would not be significant.

Roband Electronics

8.9.193 The noise mitigation feature would be completely clothed in mature native planting up to 14 years old by the end of this phase. The feature would merge successfully with the surrounding vegetation and countryside. Occupiers of the property are receptors of low sensitivity to a negligible magnitude of change resulting in a **negligible adverse** level of effect during the day and at night, which would not be significant.

Meadowcroft House

8.9.194 Receptors would continue to gain filtered views through boundary vegetation of the contractor compound for the South Terminal roundabout up to 2035, when it would be removed and grazed paddocks would be reinstated. The A23 roundabout and flyover would continue to be visible at a higher level beyond, including moving traffic. New lighting would be visible in place of existing columns on the A23 and against the backdrop of lighting at the airport. People at their place of work are receptors of low sensitivity and would experience a medium magnitude of change resulting in a **minor adverse** effect, during the day and at night, for the short term construction activities, reducing to a low magnitude of change and a **minor adverse** effect in the long term, which would not be significant.

Occupiers of the Amadeus Building and Schlumberger House Commercial Properties at South Terminal

8.9.195 People at their place of work in the Amadeus building and Schlumberger House would continue to be affected by the operational South Terminal roundabout, A23 flyover and traffic. By the end of this phase, the planting of native trees and shrubs would be up to eight years old and would partially replace the earlier phase of vegetation clearance which opened up previously concealed views of the transport corridor. Receptors at north facing windows and outdoor spaces would be of low sensitivity in the long term. The magnitude of impact would be low to medium depending on the floor of the building, leading to **negligible to minor adverse** effects during the day and at night, which would not be significant.

Occupiers of Vehicles and Trains

A23

8.9.196 Occupiers of vehicles travelling along the A23/M23 would pass through the completed surface access improvements between South Terminal and the Longbridge roundabout. By the end of this phase, the planting of native trees and shrubs around the South Terminal junction would be up to eight years old and would partially replace the earlier phase of vegetation clearance which opened up views out from the transport corridor that were previously concealed. Views from the A23 at the North Terminal junction would remain relatively open during this stage. Existing infrastructure and buildings within the airport would be visible, initially together with the associated contractor compounds immediately to the north and south. Occupiers of vehicles would be of low sensitivity to a low to medium magnitude of change, leading to a **negligible to minor adverse** effect during the day and at night in the medium to long term, which would not be significant.

Lowfield Heath Road

8.9.197 The reconfigured and realigned noise mitigation feature would be completely clothed in mature native planting up to 14 years old by the end of this phase. The feature would merge successfully with the surrounding vegetation and countryside. Occupiers of vehicles are low sensitivity receptors and would experience a negligible magnitude of change and a **negligible adverse** level of effect during the day and at night, which would not be significant.

Balcombe Road

8.9.198 Receptors in this location are represented by Viewpoint 9. The completed decked parking at Pentagon Field would be large in scale changing the character of a grazed field on the perimeter of the airport. The roadside hedgerow would be retained and maintained to a higher level and the additional tree and shrub planting, which would be up to nine years old by the end of this phase, would screen and soften many views of the new development. Decked car parks are a typical feature of the airport and would result in an intensification of an existing land use within views from the road. Occupiers of vehicles are receptors of low sensitivity to a medium magnitude of change resulting in a **minor adverse** level of effect during the day and at night, which would not be significant.

8.9.199 Pedestrians using the roadside pavement are of medium sensitivity in this location. There would be a medium magnitude of change resulting in a **moderate adverse** level of effect during the day and at night, which would not be significant.

Ifield Road

8.9.200 Receptors in this location are represented by Viewpoint 13. The reconfigured northern runway, reconfiguration/modifications of taxiways and the noise mitigation feature would continue to be barely perceptible in views through gaps in the roadside hedgerow, as previously described for 2026, resulting in a **negligible** effect, which would not be significant.

Railway

8.9.201 Occupiers of trains on the railway would continue to gain brief, filtered views of the tallest elements within the main contractor construction compound until 2035 (when it would be removed) and views east of the construction activities at the Gatwick Stream flood compensation area. In these locations passengers would be of low sensitivity to a negligible magnitude of change, resulting in a **negligible adverse** effect, which would not be significant. Near views of the new hotel at the building compound at the car rental location would be gained against a backdrop of the large-scale South Terminal. Low sensitivity receptors are likely to perceive a negligible magnitude of change and no more than **negligible adverse** effects on views, which would not be significant.

8.9.202 Near, relatively open views west would be gained of the operational A23 roundabout and flyover at North Terminal and also views east to the associated contractor compound until 2035 when it would be removed. Views of the operational surface access improvements would be initially revealed through the removal of roadside vegetation. By the end of this phase new roadside planting would be up to six years old and would start to screen and filter views of traffic. The development and compound would form prominent and at times discordant additions to the views in the short to medium term. The magnitude of change would be medium for low sensitivity receptors, resulting in **negligible to minor adverse** effects during the day and at night, which would not be significant.

Occupiers of Residential Properties

Horley Residential Edge

8.9.203 Receptors in this location are represented by Viewpoint 7. The previous removal of highway planting beside the A23 to accommodate the surface access improvements would initially reveal some filtered views of the A23 development and traffic through retained vegetation within the park and also garden vegetation and fences within a range of nearby properties on several roads on the fringes of Horley including:

- approximately 40 properties on The Crescent;
- approximately 30 properties on Riverside;
- two properties on Woodroyd Gardens;
- four properties on Cheyne Walk;
- 15 properties on Longbridge Road; and
- four first floor and four second floor apartments of two blocks of three story buildings on Longbridge Road.

8.9.204 The operational development would form a slight intensification of highway infrastructure for receptors. The degree of visibility of the development would depend largely on the intervening vegetation in Riverside Garden Park and the amount of tree and shrub vegetation within the gardens of properties. At night the lit road corridor would be visible, filtered through vegetation

against a backdrop of skyglow from the airport. Receptors at many properties listed above are unlikely to experience a perceptible change in view in the summer due to the screening properties of intervening vegetation when in leaf. The levels of effect defined below relate predominantly to winter views as a worst case. Occupiers of residential properties are receptors of high sensitivity to a negligible magnitude of change in the long term, resulting in a **minor adverse** effect, during the day and at night, which would not be significant.

Mid to Long Distance Views

8.9.205 Mid to long distance views from the surrounding landscape may include tall buildings or some high level construction activities such as cranes in limited locations. These would form recognisable additions, some slightly discordant in nature that would generally be visible above intervening tree tops and within areas of existing built development at the airport. These types of views may be gained by receptors at Viewpoint 12 at Rowley Farm bridleway, Viewpoint 13 at Lowfield Heath Road, at Viewpoint 14 on the Sussex Border Path east of Charlwood, Viewpoint 15 at Norwood Hill, Viewpoint 16 at Turners Hill and Viewpoint 17 at Tilgate Hill. The magnitude of change in view would be no more than negligible for generally high sensitivity receptors, leading to **negligible to minor adverse** effects in the medium to long term, during the day and at night, which would not be significant.

8.9.206 The increase in aircraft using realigned and reconfigured runways and taxiways at Gatwick Airport would form a barely perceptible intensification of an existing element of distant views of the airport. Therefore, it is considered that there would be no significant change to the existing baseline level of visible aircraft in 2033 to 2038.

Significance of Effect

8.9.207 No further mitigation or monitoring is required and therefore the significance of effects would remain as presented above. However, planting proposals would be included in many of the elements of the Project design. At the time of this assessment phase, the planting for most elements of the Project would be in place and would range from one year old to up to 14 years old. The beneficial effects of landscape mitigation have been included, where relevant, in the assessment above and levels of effect have been assessed accordingly. As mitigation planting continues to mature, the level of adverse effects on visual receptors is likely to reduce further.

Effects on Tranquillity within Nationally Designated Landscapes

8.9.208 The assessment of effects on the perception of tranquillity during the day and night time forms part of the landscape, townscape and visual impact assessment and draws on the assessment of overflights reported in Chapter 14: Noise and Vibration. The Gatwick Airport only overflight analysis is illustrated in Figures 8.6.3 and 8.6.5 and the combined analysis of all overflights within a wider 35 mile radius around Gatwick Airport is illustrated in Figures 8.6.4 and 8.6.6. In addition, the change in the numbers of overflights expected at nine well known and popular locations within nationally designated landscapes has been assessed individually. The assessment of the Project by the end of 2032 is approximated by considering the change in the total number of daily overflights at these locations that would arise if up to approximately 20% more Gatwick fights were added to the actual number of overflights in the baseline scenario of 2018. Appendix 14.9.2 of Chapter 14: Noise of the PEIR gives details of the methodology. 2032 is modelled as the interim year up to which air traffic numbers would increase. The results are summarised in Table 8.9.1.

Table 8.9.1: Increase in Daily Overflights at Assessment Locations

Assessment Location	Designation	Non-Gatwick Daily Overflights	Gatwick Daily Overflights	Non-Gatwick and Gatwick Daily Overflights	Non-Gatwick Overflights and Gatwick+ up to 20% Overflights by 2032	% Increase with Gatwick	Increase in Gatwick daily overflights
Hever Castle	High Weald AONB	9	246	255	304	19%	49
Ashdown Forest	High Weald AONB	3	85	88	105	19%	17
Wakehurst Place	High Weald AONB	1	12	13	15	18%	2
Leith Hill	Surrey Hills AONB	1	3	4	5	16%	0.7
Witley and Milford Commons	Surrey Hills AONB	17	1	19	19	1%	0.3
Petworth House	South Downs National Park	11	2	12	12	3%	0.3
Temple of the Winds, Blackdown	South Downs National Park	16	4	20	21	4%	0.8
Ditchling Beacon	South Downs National Park	9	4	13	13	6%	0.7
Firle Beacon	South Downs National Park	6	10	16	18	12%	2

8.9.209 The landscape and communities within the flight corridor over the High Weald AONB east of Gatwick Airport and south of Edenbridge would experience an increase in overflights of between approximately 15 and 20% to the existing baseline of more than 200 flights a day, by the year 2032. In the area of the AONB that fans out and curves to the south and west from Hever to Crowborough, where there are currently between 100 and 200 flights a day, the increase would also range from 15 to 20% of flights. Examples of people living within or using the AONB in these locations include visitors to Hever Castle and the Ashdown Forest. People would experience a relatively high level of tranquillity in landscapes of high scenic quality. These receptors are likely to be of high or very high sensitivity to change. Overflying aircraft at less than 7,000 feet currently form a regular visible or audible feature that forms a slightly discordant aspect when experiencing the landscape. The special qualities that people living within and visiting the High Weald AONB including its relative tranquillity and dark skies, whilst affected to some extent as a result of an increase in the number of overflying aircraft, would still be positive qualities that would be perceived. The largest increase in overflights would be in areas that currently experience the greatest number of overflights, where relative tranquillity is slightly lower. An increase of up to 20% in the number of aircraft following the same flight paths may be discernible to some residents or observers or barely perceptible as an increase to others. The magnitude of change would be negligible leading to **minor adverse** effects on the perception of tranquillity during the day and at night, which is not significant. Some people within the AONB may be unable to perceive the increase in the number of aircraft and would therefore experience no discernible effect to the level of tranquillity.

8.9.210 Areas of the High Weald AONB within the wider study area are generally overflown by 1 to 10 flights a day or 10 to 50 flights a day. In these two areas, people within the landscape would experience between 1 and 10 additional flights a day, respectively. The effects on the level of perceived tranquillity for high sensitivity receptors as a result of a negligible magnitude of change would be **minor adverse** as described above, which would not be significant.

8.9.211 Areas of the High Weald AONB within the 5 km radius study area are currently influenced by the large urban mass of Crawley, the concentration of people, the movement of traffic, the lighting associated with these and to a lesser extent, the intermittently visible and audible aircraft at Gatwick Airport. The presence of additional overflying aircraft in this baseline context would not lead to a significant increase in the perception of overall tranquillity or a significant change in the ability of people to enjoy the special qualities of the landscape of the fringes of the High Weald.

8.9.212 Large areas of the Surrey Hills AONB are overflown by Gatwick aircraft. A broad area of the designated landscape south of the settlements of Godalming to Haslemere is overflown by 1 to 10 flights a day and an area east of Godalming to Dorking is generally overflown by 1 to 10 or 10 to 50 flights a day. Some of these areas and communities would experience no increase in aircraft whilst others would experience an increase of between 1 and 5 flights. A small area of the AONB is overflown by 100 to 200 flights a day. In this location an increase of between 15 and 20% of flights would occur. These areas include popular and distinctive locations and local communities. People of high sensitivity using open rural spaces in the AONB such as Leith Hill would experience a negligible magnitude of change and no more than **minor adverse** effects as described above, which would not be significant. People using open spaces at Witley and Milford Commons would experience imperceptible change in the level of effects.

8.9.213 Smaller areas of the landscape on the southern edge of the Kent Downs AONB between the settlements of Merstham and Westerham and south of Sevenoaks are generally overflown by

between 1 and 10 Gatwick flights a day with smaller areas overflown by between 10 and 50 flights a day. People living within or using the landscape of the Kent Downs AONB would generally experience an increase in overflights of between 5 and 10%. The level of effects on the perception of tranquillity of high sensitivity receptors within these landscapes would be of negligible magnitude leading to **minor adverse** effects as described above, which would not be significant.

8.9.214 There would be very limited additional flights at less than 7,000 feet above ground level over the South Downs National Park. Small areas on the northern fringes of the designated landscape would generally experience an increase of between 0 and 5% as a result of the Project. The level of effects on the perception of tranquillity within landscapes at Temple of the Winds and Firle Beacon would be no more than **minor adverse** as described above, which would not be significant. People using open spaces at Petworth House and Ditchling Beacon would experience imperceptible effects.

8.9.215 Notwithstanding the potential 20% increase in the number of flights at less than 7,000 feet above ground level by 2032, in terms of noise emission levels, the future baseline would include changes in the aircraft fleet to quieter types. It is predicted that in 2032 there would be a reduction in the area of landscape and townscape affected by aircraft noise and, therefore, the number of residents affected living in the affected area, which supports the assessment of minor adverse effects within the study area.

Design Year: 2038 and Beyond

8.9.216 This section describes the continuing change in the level of effects that would occur as a result of the maturing landscape mitigation proposals embedded within many elements of the Project. The change in the landscape or townscape character or visual amenity as a result of planting proposals has been included in the sections above through the 15 year construction programme from 2024 to 2038. However, the design year for landscape planting, where it begins to reach its intended function at maturity is generally considered to be 15 years after implementation. Elements of the Project completed in the early years of the construction programme that have planting proposals associated with them would be 12 to 14 years old by the end of 2038. The beneficial effect on character and visual amenity of this relatively mature planting is described and assessed above for the following developments:

- noise mitigation feature;
- fire training ground;
- relocation of Pond A;
- flood compensation at Museum Field and land east of Museum Field;
- River Mole diversion;
- replacement Purple Parking at Crawter's Field;
- South Terminal extensions and forecourt (most elements); and
- North Terminal extensions and forecourt (most elements).

8.9.217 The following section of this chapter will therefore focus on the elements of the Project completed within the mid to later part of the 15 year programme where landscape planting proposals are immature at 2038 (between one and nine years old) and yet to achieve their design function:

- CARE Facility;
- New hangar;

- Pentagon Field decked car park;
- Offices, hotel and multi-storey car park at South Terminal car park H;
- North Terminal Long stay decked car park;
- Surface access/ North Terminal, South Terminal and Longbridge roundabouts; and
- Gatwick Stream flood compensation area.

8.9.218 Key effects are summarised in table format in the summary section at the end of the chapter (see Table 8.13.1).

8.9.219 A summary of the maximum design scenario dimensions required for the following elements of the Project is provided in Table 8.7.1. Further detail of the landscape mitigation proposals that would reach maturity after 2038 (in addition to those already identified) is provided below.

CARE Facility

8.9.220 The landscape proposals associated with the 22 metre high CARE Facility with a 50 metre high flue would reach maturity in 2045.

New Hangar

8.9.221 The landscape proposals associated with the 32 metre high new hangar north of Larkins Road would reach maturity in 2048.

Pentagon Field Decked Car Park

8.9.222 The landscape proposals associated with the decked car park structure up to 8 metres high on land raised by up to 4.4 metres, occupying a footprint of approximately 8.8 hectares would reach maturity in 2044.

Offices, Hotel and Multi-storey Car Park at South Terminal Car Park H

8.9.223 The landscape proposals associated with the group of new buildings up to 27 metres high in car park H would reach maturity in 2045.

North Terminal Long Stay Decked Car Park

8.9.224 The landscape proposals associated with the decked car park covering 13 hectares and up to 11 metres high would reach maturity in 2048.

Surface Access/ North Terminal, South Terminal and Longbridge Roundabouts

8.9.225 The landscape proposals associated with the surface access improvements incorporating steel and concrete flyovers at North and South Terminal Roundabouts, extensive earthworks and reinforced earth-walls and acoustic barriers would reach maturity in 2047 to 2050.

Gatwick Stream Flood Compensation Area

8.9.226 The landscape proposals associated with the flood compensation area of 18,000 m^2 within hedgerow bounded grass fields would reach maturity in 2053.

Effects on Landscape Character

Gatwick Airport Character Area

8.9.227 The completed and operational elements of the Project are described above in the 2033 to 2038 phase. The elements of the Project listed above all lie within the Gatwick Airport Character Area and the beneficial nature of the landscape mitigation proposals would improve the character and quality of the airport when mature. All elements of the Project constructed within the earlier phases of the Project would now be operational. The alterations to the hardstanding of the northern runway, reconfiguration/modifications of taxiways, holding areas and stands would represent a relatively minor increase in hardstanding and a decrease in grassland within the airport. The replacement Purple Parking at Crawter's Field would have formed an intensification of an existing typical land use within the airport.

8.9.228 The South Terminal hotel, office buildings and multi-storey car park H would significantly increase the scale and mass of tall buildings within this cluster. Existing mature tree and shrub planting around existing car park H would be retained and supplemented with ornamental tree and shrub planting to form an attractive, integrated series of external spaces that connect public and private areas.

8.9.229 The A23 surface access improvements, comprising the improved South Terminal and North Terminal roundabouts, new flyovers and steep retained earthworks requires the removal of large areas of mature woodland and scrub planting. After 15 years the new woodland planting would begin to achieve similar levels of softening and screening of the road improvements and connect with adjoining areas of vegetation at Riverside Garden Park and within the airport, reinstating the highway character.

8.9.230 The Pentagon Field decked car park and North Terminal Long Stay decked car park would introduce large scale structures on the edge of the airport that form either an intensification or extension of existing, typical airport infrastructure. The new tree and shrub planting associated with the North Terminal car park would be located around the perimeter of the scheme, integrating with the network of vegetation strips currently typical of the internal airport layout. The planting would soften the outline and reduce the apparent scale and massing of this extensive structure. New hedgerow and tree planting located around the perimeter of the Project at Pentagon Field would provide an appropriate framework of green infrastructure incorporating native species typical of this farmland edge location and planting within the airport.

8.9.231 The CARE Facility would include large scale tall buildings and a tall slender flue. Screen fencing and perimeter tree and shrub planting of predominantly native species would screen low level visual clutter of industrial character that would otherwise influence the character of the airport. Planting would integrate with the overall existing and proposed green infrastructure at Gatwick Airport.

8.9.232 The new hangar north of Larkins Road would incorporate perimeter tree and shrub planting, particularly to the north, to soften the apparent scale and mass of the large scale built form within the context of airport infrastructure and the wider rural landscape to the north.

8.9.233 Native tree and shrub planting would be used to supplement and enhance existing hedgerows at Museum Field. The engineering works for the flood compensation areas would be softened and

merged into the pattern of farmed fields on the western edge of Gatwick Airport, resulting in minimal impact on the character of the airport.

8.9.234 The adverse impacts of the addition of large-scale buildings and structures across the airport would be partially offset by the beneficial impacts of landscape mitigation measures which would be fully mature. Overall, the long term level of effect would be **minor adverse**, during the day and at night, which would not be significant. However, the more sensitive rural fringe nature of the Pentagon Field site to the change as a result of the decked car park would result in a high magnitude of impact that cannot be further mitigated through landscape proposals. There would be a **major adverse** effect, which would be significant.

High Woodland Fringes Character Area

8.9.235 The decked car parking at Pentagon Field would lie adjacent to the rural farmland of the character area. The new hedgerow and tree planting located around the perimeter of the Project site would now be mature and would provide screening and a strong landscape edge feature to the airport. The sensitivity of the High Woodland Fringes to these impacts in this context is low and the magnitude of change would be negligible, resulting in **negligible** effect in the long term during the day and at night, which would not be significant.

Mole Valley Open Weald Character Area

8.9.236 The landscape planting proposals associated with the Longbridge roundabout and attenuation feature would provide beneficial impacts and would offset any adverse effects on the character of the field or influence over the neighbouring open space and conservation area. The low sensitivity character area and low magnitude of beneficial and adverse effects would, in the long term, result in **neutral** effects.

8.9.237 The taller and more mature planting around the CARE Facility is unlikely to screen the top of the flue. Red aviation warning lights, if required, would continue to be visible as small, although prominent, light sources in the context of a well-lit airport at night.

8.9.238 At night, light sources at the North Terminal Long Stay decked car park and the new hangar may continue to be visible in the winter through bare intervening vegetation. The Project would intensify the existing well-lit character of the airport and would have minimal additional influence outside of the airport.

8.9.239 The sensitivity of the character area to these effects in this context is low and the magnitude of change would be low, resulting in no more than **negligible adverse** effects in the long term during the day and potentially **minor adverse** effects at night, which would not be significant.

Low Weald Character Area

8.9.240 The visibility of the tops of tall buildings within the South Terminal cluster would not be influenced by the landscape proposals and would continue to have an influence over the adjacent landscape of the Low Weald in Reigate and Banstead District.

8.9.241 The extensive woodland planting associated with the improved South Terminal roundabout and flyover structure would be sufficiently mature to further improve the character of the A23/M23 transport corridor in this location and would reduce its influence over the farmland on the edge of the Low Weald character area. The character area is considered to be of low sensitivity to these

types of changes. The low magnitude of impact would result in a **negligible** effect during the day and at night, in the long term, which would not be significant.

Effects on Townscape Character

Northgate Crawley Townscape Character Area

8.9.242 Restoration of the main contractor construction compound MA1 to its existing use of staff car park would have a **no change/neutral** effect on this character area.

Horley Townscape Character Area

8.9.243 The landscape planting proposals associated with the Longbridge roundabout and attenuation feature would be mature and would offset any adverse effects on the character of the open space and conservation area. The low sensitivity of the character area to these changes and low magnitude of beneficial and adverse impacts would, in the long term, result in **neutral** effects.

8.9.244 The mature woodland planting incorporated into the improved surface access corridor would restore the buffer between the road and the Riverside Garden Park within this townscape character area. The effect on character of this part of the Horley Townscape character area would be of negligible magnitude on a medium sensitivity receptor, leading to long term **negligible** effects in the day and at night, which would not be significant.

Effects on Visual Receptors

Members of Gatwick Staff

8.9.245 The tallest building and the flue at either of the CARE facility option locations would continue to form prominent or recognisable features with an industrial character, slightly at odds within the airport context.

8.9.246 The mature planting associated with the three flood compensation areas would not be visible for most people working at Gatwick Airport.

8.9.247 The operational North and South Terminal roundabouts, flyovers and A23 improvements, including moving traffic, would be largely screened by mature woodland planting in views from locations on the northern edge of the airport and slightly more apparent than the existing road where the raised level of the flyovers can be seen. At night, lighting columns would be slightly more apparent in some locations, creating a slight intensification of effects in a well-lit context.

8.9.248 The mature planting at the base of the new hangar north of Larkins Road would filter and screen some views of this large scale, visually prominent element in the western part of the airport.

8.9.249 The South Terminal hotel, office buildings and multi-storey car park H would introduce further tall buildings of a high quality architectural design within these main development clusters. Existing planting around existing car park H would be retained to screen or minimise views of new built development and additional ornamental tree and shrub planting would form an attractive, integrated series of external spaces for members of Gatwick Airport staff.

8.9.250 The mature tree and shrub planting associated with the Pentagon Field decked car park and North Terminal Long Stay decked car park would soften the outline and reduce the apparent scale and massing of these large-scale structures. Perimeter hedgerow and tree planting would

provide an appropriate framework of green infrastructure typical of internal infrastructure and the neighbouring farmland.

8.9.251 The operational elements of the Project would be visible to members of Gatwick Airport staff working in different locations within the airport or using staff car parks and internal access roads. People at their place of work are generally considered to have a low sensitivity to change, particularly given the nature of the change and the context of a busy international airport. The various elements of the Project may be barely perceptible when seen at distance, or prominent and at times dominant when in close proximity. The magnitude of change would range from generally negligible or low to, in some cases high, resulting in generally **negligible to minor adverse** effects with some **moderate adverse** effects, which would not be significant.

Members of the Public Visiting Gatwick

8.9.252 Members of the public using the airport access roads and North Terminal long stay surface car parks would continue to gain some near open views of the CARE facility, North Terminal Long Stay decked car park, the new hangar, the North Terminal and South Terminal roundabout and flyover, South Terminal hotel, office buildings and multi-storey car park H adjacent to the South Terminal. After 15 years the new woodland planting would begin to achieve similar levels of softening and screening of the road improvements and would provide an attractive, integrated series of external spaces that connect public and private areas and opportunities to filter and screen views of tall buildings and structures, generally in close proximity to existing building clusters. The nature and extent of these developments would be less prominent in near views within the airport context. Occupiers of vehicles are receptors of low sensitivity to a negligible to medium magnitude of change resulting in a **negligible or minor adverse** level of effect during the day and at night, which would not be significant. Pedestrians using public right of way 346/2Sy would experience **negligible to minor adverse** effects in 2048, which would not be significant.

Walkers using Public Rights of Way

River Mole Public Right of Way

8.9.253 Receptors in this location are represented by Viewpoints 4 and 5. Walkers would gain near, heavily filtered views through intervening vegetation of the flue and lighting at the CARE facility. Walkers would be of high sensitivity to negligible impacts resulting in **minor adverse** effects, during the day and at night, in the long term, which would not be significant.

Public Right of Way 359/Sy Pentagon Field

8.9.254 Receptors in this location are represented by Viewpoint 10. Walkers would gain filtered and partially screened, near views through mature tree and shrub planting of the decked car park and traffic, more so in the winter when vegetation is not in leaf. Walkers are receptors of high sensitivity and would experience a low magnitude of change, resulting in a **moderate adverse** effect in the winter when vegetation is generally bare and a **minor adverse** effect in the summer, which would not be significant.

Public Right of Way 360/1Sy Tinsley Green

8.9.255 Receptors in this location are represented by Viewpoint 11. Walkers would gain some near open and some filtered views of the flood compensation area with landscape mitigation proposals in place. The grass seeded slopes of the earthworks would be relatively inconspicuous within this

context although would slightly change the character of the grassland fields. Walkers are receptors of high sensitivity to a low magnitude of change, resulting in a **minor adverse** level of effect, which is not significant.

Public Right of Way 236a Horley

8.9.256 Receptors in this location are represented by Viewpoint 8. The new replacement woodland planting incorporated into the A23 scheme would be sufficiently mature, screening and filtering views of the road infrastructure and traffic, more so in the summer when in leaf. The moving traffic would remain noticeable in winter, particularly on the new raised overbridge. Walkers are receptors of high sensitivity and would experience a medium magnitude of change in the winter resulting in a **moderate adverse** effect and a low magnitude of change and a **minor adverse** effect in the summer, during the day. At night there would be a low magnitude of change and a **minor adverse**, for the long term, which would not be significant.

Public Right of Way 574 and Church Meadows Public Open Space Horley

8.9.257 Walkers crossing this open space within the Church Road Horley conservation area would gain filtered views through foreground trees of the well vegetated attenuation pond and mature, replacement roadside vegetation which would be sufficient to screen and filter most views of the traffic and infrastructure of the Longbridge roundabout. Walkers are receptors of high sensitivity and would experience a low magnitude of beneficial changes resulting in **minor beneficial** effects during the day and at night, for the long term, which would not be significant.

Cyclists

National Cycle Route 21

8.9.258 Cyclists using the national cycle route through Riverside Garden Park are represented by Viewpoint 6. New replacement woodland planting within the surface access scheme would be sufficiently mature after 15 years to screen and filter views of the road infrastructure and traffic, more so in the summer when in leaf. The moving traffic would remain noticeable in winter. Cyclists are receptors of high sensitivity to a low magnitude of change in the long term, resulting in a **moderate adverse** effect in winter, during the day and at night and **minor adverse** effects in the summer, during the day and at night, which would not be significant. Pedestrians using the path would experience the same levels of effect.

Occupiers of Commercial Properties

Hilton Hotel

8.9.259 Occupiers of rooms on the east facing elevation of the Hilton Hotel would benefit from the mature street trees and shrub planting associated with the new South Terminal hotel to filter and soften views of the buildings and street scene. Medium sensitivity receptors would experience a medium magnitude of change in the long term, resulting in a **moderate adverse** effect during the day and at night, which would not be significant.

Members of the Public using the McDonald's and KFC at South Terminal

8.9.260 Woodland planting associated with the South Terminal roundabout and A23 flyover would filter and screen views of the road infrastructure and traffic for people at north facing windows and outdoor spaces. Receptors would be of medium sensitivity in the long term. The magnitude of

impact would be low, leading to **minor adverse** effects during the day and at night, which would not be significant.

Meadowcroft House

8.9.261 The South Terminal roundabout and flyover would be visible at a higher level beyond a foreground of pasture fields, filtered through mature woodland planting, including moving traffic and lighting. People at their place of work are receptors of low sensitivity and would experience a low magnitude of change resulting in a **minor adverse** effect, during the day and at night, for the long term, which would not be significant.

Occupiers of the Amadeus Building and Schlumberger House Commercial Properties at South Terminal

8.9.262 The mature woodland planting associated with South Terminal roundabout and flyover would filter views of development, traffic, lighting and signage. People at their place of work in the Amadeus building and Schlumberger House would continue to be affected by the South Terminal roundabout, flyover and traffic in 2038, more so in the winter when vegetation is not in leaf. Receptors at north facing windows and outdoor spaces would be of low sensitivity in the long term. The magnitude of impact would be low to medium depending on the floor of the building, leading to **negligible** to **minor adverse** effects during the day and at night, which would not be significant.

Occupiers of Vehicles and Trains

A23

8.9.263 Occupiers of vehicles travelling along the A23/M23 would pass through belts of mature woodland and scrub planting either side of the road. Views out to existing and new development at Gatwick Airport, Riverside Garden Park at Horley and the rural landscape would be largely screened or heavily filtered in the summer when vegetation is in leaf and less filtered in the winter. The sequence of views experienced at speed by occupiers of vehicles would be focused on the road, traffic and green infrastructure, similar to the existing situation. The overbridges at the North and South Terminal roundabouts would provide greater opportunity for elevated views of the surroundings, partially filtered by vegetation. Occupiers of vehicles would be of low sensitivity to a negligible to low magnitude of change, leading to a **negligible to minor adverse** effect during the day and at night in the long term, which would not be significant.

Balcombe Road

8.9.264 Receptors in this location are represented by Viewpoint 9. Occupiers of vehicles travelling along this road would gain filtered and partially screened, near views through the roadside hedgerow retained and maintained to a higher level and mature tree and shrub planting, of the decked car park and traffic, more so in the winter when vegetation is not in leaf. Views of decked car parks through surrounding green infrastructure are a typical feature of the airport and would result in an intensification of an existing land use within views from the road. Occupiers of vehicles are receptors of low sensitivity to a low magnitude of change resulting in a **negligible or minor adverse** level of effect during the day and at night, which would not be significant.

8.9.265 Pedestrians using the roadside pavement are of medium sensitivity in this location. There would be a low magnitude of change resulting in a **minor to moderate adverse** level of effect during the day and at night, which would not be significant.

Railway

8.9.266 Passengers would gain near relatively open, glimpsed views east and west of the A23 improvements including flyovers set within a framework of mature woodland and scrub planting and grass verges. The highway corridor, traffic, signage and lighting would form prominent elements in views in the long term however, by 2048 this would be similar to the existing situation. The magnitude of change would be low for low sensitivity receptors, resulting in **negligible adverse** effects during the day and at night, which would not be significant.

Occupiers of Residential Properties

Horley Residential Edge

8.9.267 Receptors in this location are represented by Viewpoint 7. New replacement woodland planting within the surface access scheme would be sufficiently mature after 15 years to screen and filter views of the road infrastructure and traffic, more so in the summer when in leaf. The moving traffic would remain noticeable in winter. Occupiers of the following nearby properties on the fringes of Horley would gain filtered views of the improvements and mature planting through retained vegetation within the park and private gardens and over garden fences:

- approximately 40 properties on The Crescent;
- approximately 30 properties on Riverside;
- two properties on Woodroyd Gardens;
- four properties on Cheyne Walk;
- 15 properties on Longbridge Road; and
- four first floor and four second floor apartments of two three story blocks on Longbridge Road.

8.9.268 At night in the winter the lighting columns, lit signs and vehicle lights would be barely discernible, filtered through vegetation against a backdrop of skyglow from the airport. Receptors at many properties listed above are unlikely to experience a perceptible change in view in the summer due to the screening properties of intervening vegetation when in leaf. The levels of effect defined below relate predominantly to winter views as worst case scenarios. Occupiers of residential properties are receptors of high sensitivity to a negligible magnitude of change in the long term, resulting in a **minor adverse** effect, during the day and at night, which would not be significant. During the summer when vegetation is in leaf there is unlikely to be any discernible change in view by 2048.

Mid to Long Distance Views

8.9.269 Mid to long distance views from the surrounding landscape may include the tops of new tall buildings and the CARE flue stack in the context of existing tall buildings. These would form recognisable or barely perceptible additions seen above intervening tree tops. The mature landscape planting proposals would not change these mid to long distance views. Receptors of generally high sensitivity at Viewpoint 12 at Rowley Farm bridleway, Viewpoint 13 at Lowfield Heath Road, at Viewpoint 14 on the Sussex Border Path east of Charlwood, Viewpoint 15 at Norwood Hill, Viewpoint 16 at Turners Hill and Viewpoint 17 at Tilgate Hill would experience no more than a negligible change in view, leading to **negligible to minor adverse** effects in the long term, during the day and at night, which would not be significant.

Significance of Effects

8.9.270 The above assessment has taken into account the planting proposals included in many of the elements of the Project, including an assessment of the effect once this has matured. No further mitigation or monitoring is required and therefore the significance of effects would remain as presented above.

Effects on Tranquillity within Nationally Designated Landscapes

8.9.271 The heat mapping for the proposed overflights, during both day and night time, is based on an increase of up to approximately 20% by the end of 2032 and would remain at this level at 2038. Figure 8.6.5 shows the increase in the number of overflights in each grid square as a colour and Figure 8.6.6 shows the increase in Gatwick flights combined with non-Gatwick flights. The areas of the landscape currently overflown by the largest number of aircraft would experience the greatest number of additional aircraft. The data within Table 8.9.1 are also relevant to the assessment of effects in 2038.

8.9.272 The landscape and communities within the flight corridor over the High Weald AONB east of Gatwick and south of Edenbridge would experience an increase in overflights of between approximately 15 to 20% to the existing baseline of >200 flights a day. In the area of the AONB that fans out and curves to the south and west from Hever to Crowborough, where there are currently between 100 and 200 flights a day, the increase would also range from 15 to 20%. Examples of people living within or using the AONB in these locations include visitors to Hever Castle and the Ashdown Forest. People would experience a relatively high level of tranquillity in landscapes of high scenic quality. These receptors are likely to be of high or very high sensitivity to change. Overflying aircraft at less than 7,000 feet currently form a regular visible or audible feature that forms a slightly discordant aspect when experiencing the landscape. An increase of up to 20% in the number of aircraft following the same flight paths may be discernible to some observers or barely perceptible as an increase to other observers. The magnitude of change for high sensitivity receptors would be negligible leading to **minor adverse** effects on the perception of tranquillity during the day and at night, which would not be significant. Some people within the AONB may be unable to perceive the increase in the number of aircraft and would therefore experience no discernible effect to the level of tranquillity. Areas of the High Weald AONB within the study area are generally overflown by 1 to 10 flights a day or 10 to 50 flights a day. In these two areas people within the landscape would experience between 1 and 10 additional flights a day respectively. The effects on the level of perceived tranquillity would be the same as described above.

8.9.273 Large areas of the Surrey Hills AONB are overflown by Gatwick aircraft. A broad area of the designated landscape south of the settlements of Godalming to Haslemere is overflown by 1 to 10 flights a day and an area east of Godalming to Dorking is generally overflown by 1 to 10 or 10 to 50 flights a day. Some of these areas would experience no increase in aircraft whilst others would experience an increase of between 1 and 5 flights. A small area of the AONB is overflown by 100 to 200 flights a day. In this location an increase of between 15 and 20% of flights would occur. High sensitivity receptors in these areas, which include popular and distinctive open rural spaces in the AONB such as Leith Hill would experience a negligible magnitude of change and no more than **minor adverse** effects as described above, which would not be significant. People using open spaces at Witley and Milford Commons would experience imperceptible effects.

8.9.274 Smaller areas of the landscape on the southern edge of the Kent Downs AONB between the settlements of Merstham and Westerham and south of Sevenoaks are generally overflown by between 1 and 10 Gatwick flights a day with further small areas overflown by between 10 and 50 flights a day. People living within or using the landscape of the Kent Downs AONB within areas overflown by between 1 and 10 flights would generally experience an increase in overflights of between 5 and 10%. The level of effects on the perception of tranquillity as a result of high sensitivity receptors experiencing negligible change within these landscapes would be **minor adverse** as described above, which would not be significant.

8.9.275 There would be very limited additional flights of less than 7,000 feet above ground level over the South Downs National Park. Small areas on the northern fringes of the designated landscape would generally experience an increase of between 0 and 5% as a result of the Project. The level of effects on the perception of tranquillity for high sensitivity receptors at Temple of the Winds and Firle Beacon within these landscapes would be no more than **minor adverse** as described above as a result of a negligible magnitude of change, which would not be significant. People using open spaces at Petworth House and Ditchling Beacon would experience imperceptible effects.

8.9.276 The maximum predicted increase in the number of overflights by 2038 is based on the same 20% as described previously in the assessment for 2033 to 2038. The presence of additional overflying aircraft in the various baseline contexts of the nationally designated landscapes within the study area would not lead to a significant increase in the perception of overall tranquillity or a significant change in the ability of people to enjoy the special qualities of the landscapes.

8.9.277 Notwithstanding the potential 20% increase in the number of flights at less than 7,000 feet above ground level by the end of 2032 up to 2038, in terms of noise emission levels, the future baseline would include changes in the aircraft fleet to quieter types. Between 2032 and 2038 the fleet would continue to change to quieter types, resulting in further reductions in baseline levels. It is predicted that in 2038 there would be a reduction in the area of landscape and townscape affected by aircraft noise and, therefore, the number of residents affected living in the affected area, which supports the assessment of minor adverse effects within the study area.

8.10. Potential Changes to the Assessment as a Result of Climate Change

8.10.1 Chapter 15: Climate Change and Carbon of this PEIR presents statistics for predicted changes in the climate between 2020 and 2079 as a result of extreme weather events of heat, cold, rainfall, drought and wind. It is predicted that mean temperatures will increase, winter precipitation will increase; and summer precipitation will decrease.

8.10.2 Overall the frequency of hot days, dry spells and heavy rainfall is predicted to increase. The predictions are that hot day temperatures >25 ^{o}C and heavy rainfall will pose an increased risk to Gatwick Airport operations and fewer cold temperatures will pose a decreased risk.

8.10.3 The baseline situation described within this landscape, townscape and visual resources chapter includes landscapes of the Low Weald and High Weald. These contain various types of vegetation including native woodlands, hedgerows, trees, grassland and wetlands. The climate change predictions are unlikely to be sufficient to lead to a change in the baseline vegetation conditions for the purposes of this assessment. The various components of the landscape and the intrinsic character will remain essentially the same. The assessment of effects on landscape character and the related assessment of visual effects would therefore be the same as presented within this chapter.

8.10.4 Landscape mitigation proposals provide an opportunity to build in climate resilient solutions for the Project. Key elements would be:

- vegetation retention strategy to ensure the maximum extent of green infrastructure is retained within the Project site boundary;
- earthworks cut and fill balance to retain and reuse the maximum volume of spoil within the Project site boundary;
- planting proposals appropriate to the Gatwick location and to the future climate change scenario;
- enhancement of green infrastructure through management proposals; and
- preparation of Landscape and Environmental Management Plan (LEMP) for long term objectives.

8.11. Cumulative Effects

Zone of Influence

8.11.1 The zone of influence (ZoI) for Landscape, Townscape and Visual Resources has been identified based on the spatial extent of likely effects within the 5 km radius study area defined by the ZTV for the Project.

Screening of Other Developments and Plans

8.11.2 The Cumulative Effect Assessment (CEA) takes into account the impact associated with the Project together with other developments and plans. The developments and plans selected as relevant to the CEA presented within this chapter are based upon the results of a screening exercise undertaken as part of the 'CEA short list' of developments (see Appendix 19.4.1). Each development on the CEA long list has been considered on a case by case basis for scoping in or out of this chapter's assessment based upon data confidence, effect-receptor pathways and the spatial/temporal scales involved.

8.11.3 In undertaking the CEA for the Project, it is important to bear in mind that the likelihood of other developments and plans being constructed varies depending on how far along the planning process they are. For example, relevant developments and plans that are already under construction are likely to contribute to a cumulative impact with the Project (providing impact or spatial pathways exist), whereas developments and plans not yet approved or not yet submitted are less certain to contribute to such an impact, as some may not achieve approval or may not ultimately be built due to other factors. For this reason, all relevant development and plans considered cumulatively alongside the Project have been allocated into 'Tiers', reflecting their current stage within the planning and development process. Appropriate weight is therefore given to each Tier in the decision-making process when considering the potential cumulative impact associated with the Project (eg it may be considered that greater weight can be placed on the Tier 1 assessment relative to Tier 2 or Tier 3). Further details of the screening process for the inclusion of other developments and plans in the short list and a description of the Tiers are provided in Chapter 19: Cumulative Effects and Inter-relationships.

8.11.4 The specific developments scoped into the CEA for Landscape, Townscape and Visual Resources and the Tiers into which they have been allocated, are outlined in Table 8.11.1. The developments included as operational in this assessment have been commissioned since the baseline studies for this Project were undertaken and as such have been excluded from the

baseline assessment set out in this chapter. The baseline environment, including such developments, will be reviewed and updated in the ES. Full details of each of the developments are provided in Appendix 19.4.1.

8.11.5 The short-listed cumulative developments within the 5 km radius study area for the Project which have not been considered in the CEA set out in this chapter of the PEIR include residential and commercial developments located within the urban townscapes of Crawley and Horley and the edges of smaller settlements. There would be no direct cumulative effect on the Gatwick Airport Urban Character Area as these developments are located outside of this character area. There would also be no intervisibility for members of staff and visitors to Gatwick Airport with buildings and infrastructure at the Project and cumulative developments and therefore no opportunity for adverse effects on visual receptors in these locations. Cumulative visual effects would be limited to receptors on the southern edge of Horley.

8.11.6 Sixteen of the 41 short listed cumulative developments have been assessed in the CEA for this chapter of the PEIR (albeit several of these applications relate to the Forge Wood development). These include predominantly residential developments and some commercial developments.

Table 8.11.1: List of Other Developments and Plans considered within CEA

Description of Development/Plan	Planning Phase	Distance from the Project	Date of Construction (if applicable)	Overlap with the Project?
Tier 1				
CR/2016/0858/ARM Residential led scheme 2.47 hectares (reserved matters).	Under construction	1.6 km	Under construction	All phases
CR/2016/0083/ARM Residential led scheme 4.7 ha, 249 dwellings.	Under construction	2.1 km	Under construction	All phases
CR/2016/0962/ARM Residential led scheme 4.59 ha, 151 dwellings.	Under construction	2.2 km	Under construction	All phases
CR/2016/0114/ARM Residential led scheme 4.7 ha, 75 dwellings.	Under construction	2.1 km	Under construction	All phases
CR/2016/0780/ARM Residential led scheme 6.24 ha, 225 dwellings.	Under construction	2.2 km	Under construction	All phases
CR/2018/0544/OUT Scoped out of assessment	Located within urban centre of Crawley with no intervisibility with Project.			
CR/2017/0810/FUL Park and ride car park for 892 vehicles, 2.78 ha	Awaiting decision	1.2 km	2021 to 2024	All phases

Description of Development/Plan	Planning Phase	Distance from the Project	Date of Construction (if applicable)	Overlap with the Project?
CR/2018/0894/OUT Residential led scheme 5.5 ha, 185 dwellings.	Awaiting decision	1.3 km	2021 to 2022	All phases
CR/2016/0997/FUL Scoped out of assessment	Located within urban centre of Crawley with no intervisibility with Project.			
CR/2012/0134/OUT Scoped out of assessment	Located within urban centre of Crawley with no intervisibility with Project.			
CR/2017/0997/OUT Scoped out of assessment	Located within urban centre of Crawley with no intervisibility with Project.			
R&B. 04/02120/OUT Scoped out of assessment	Located on northern urban edge of Horley, distant from Project site with no intervisibility with Project.			
T. 2019/548/EIA Scoped out of assessment	Located on northern urban edge of Copthorne, distant from Project site with no intervisibility with Project.			
H. DC/17/2481 Scoped out of assessment	Located on south-western urban edge of Crawley, distant from Project site with no intervisibility with Project.			
MS. 13/04127/OUTES Scoped out of assessment	Located east of M23, distant from Project site with no intervisibility with Project.			
CR/2015/0552/NCC (and subsequent reserved matters and non-material amendment applications) Residential 1900 dwellings, business, retail and community facilities.	Crawley Local Plan 2030 Adopted	1.6 km	Completion 2027	All phases
CR/2019/0542/FUL Residential 152 apartments and ground level retail/commercial. Scoped out of assessment	Located within urban centre of Crawley with no intervisibility with Project.			
CR/2015/0718/ARM Residential 169 dwellings. Known as Forge Wood.	Granted permission	1.6 km	Completion 2027	All phases
20/02515/SCREEN Crematorium Scoped out of assessment	Located more than 7 km from site with no intervisibility with Project			
20/02017/S73 Residential 43 apartments Scoped out of assessment	Located within urban centre of Horley with no intervisibility with Project.			
DC/10/1612 Residential 2500 retail and community	Located more than 6 km from site with no intervisibility with Project			

Description of Development/Plan	Planning Phase	Distance from the Project	Date of Construction (if applicable)	Overlap with the Project?
Scoped out of assessment				
EIA/20/0004 Residential up to 4000 dwellings	Allocated. Scoping	1.5 km	Not known	All phases
13/04127/OUTES Residential up to 500 dwellings and B1/B8 Scoped out of assessment	Located more than 8 km from site with no intervisibility with Project			
DM/20/4127 Commercial Scoped out of assessment	Located more than 7 km from site with no intervisibility with Project			
CR/2018/0273/FUL Gatwick transport improvements Scoped out of assessment	Relevant to traffic assessment only			
Tier 2				
EIA/20/0004	As above			
TR020003 (PINS Reference) London Borough of Hillingdon Scoped out of assessment	Located distant from Project site with no intervisibility with Project.			
Tier 3				
Outline application CR/2018/0544/OUT Tinsley Lane Residential led scheme Scoped out of assessment	Located within urban centre of Crawley with no intervisibility with Project.			
Land west of Balcombe Road, Horley Strategic Business Park	Development Management Plan 2018-2027	0.4 km	Unknown	All phases
Land off The Close and Haroldslea Drive Residential led scheme 40 dwellings, 2.4 ha	Development Management Plan 2018-2027	1.2 km	Unknown	All phases
Land North of Rosemary Lane Charlwood Scoped out of assessment	Located north of urban edge of Charlwood with no intervisibility with Project.			
Land east of Ifield Road Residential development 150 dwellings, 9 hectares.	Housing and Traveller Site Plan Adopted 2014	1.4 km	Unknown	All phases

Description of Development/Plan	Planning Phase	Distance from the Project	Date of Construction (if applicable)	Overlap with the Project?
Land adjacent to Desmond Anderson Residential 150 dwellings Scoped out of assessment	Located more than 6 km from site with no intervisibility with Project			
Land to the southeast of Heathy Farm, Balcombe Road Residential 150 dwellings Scoped out of assessment	Located on northern edge of Crawley with no intervisibility with Project.			
Telford Place/ Haslett Avenue Residential 300 dwellings Scoped out of assessment	Located within urban centre of Crawley with no intervisibility with Project.			
Crawley College Residential 400 dwellings Scoped out of assessment	Located within urban centre of Crawley with no intervisibility with Project.			
Land east of Balcombe Road and South of the M23 Spur - 'Gatwick Green' Industrial	Allocated	0	Unknown	All phases
Land at Plough Road and Redehall Road, Smallfield Residential 160 dwellings Scoped out of assessment	Located at Smallfield with no intervisibility with Project.			
Land North of Plough Road, Smallfield Residential 120 dwellings Scoped out of assessment	Located at Smallfield with no intervisibility with Project.			
Land West of Reigate Road, Hookwood Site Allocation Policy SA42 Residential 450 dwellings	Consultation Draft Local Plan	0.3 km	Unknown	All phases
Gatwick Airport Sewage Treatment Works	None, as yet	0	Unknown	Possible

Cumulative Effects Assessment

8.11.7 A description of the significance of cumulative effects upon Landscape, Townscape and Visual receptors arising from each identified impact is given below.

Initial Construction Phase: 2024 - 2029

Effects on Landscape and Townscape Character

High Woodland Fringes Character Area

8.11.8 The developments considered within the cumulative effects assessment (CEA) generally lie within the High Woodland Fringes character area in Crawley District. The addition of 10 (five of which combine to form the Forge Wood development) of the predominantly residential cumulative developments (nine Tier 1 and one Tier 3) into the Crawley urban fringe landscape of ribbon developments, fields and copses extending up to the edge of Gatwick Airport would form a more developed character area, adjacent to which some elements of the Project would be placed. The urban fringe characteristics of the High Woodland Fringes would be considerably intensified within this character area as a result of the construction phase or completed 10 cumulative developments. The intrinsic character of the area would be changed to residential development within a framework of woodland and hedgerows on the edge of Gatwick Airport. The Pentagon Field decked car park within Gatwick Airport would be developed on the edge of the High Woodland Fringes character area. The condition of the character area would be ordinary to good and the overall sensitivity would be low to medium. The ongoing construction or completion of 10 CEA developments, together with the influence of the construction phase of the Project would result in a high magnitude of change, leading to a **major adverse** level of cumulative landscape effect in the day and at night, which would be significant. The Project (primarily the deposit of spoil and construction of the car park at Pentagon Field), in the context of the 10 combined much larger and more influential CEA developments, would make a negligible contribution to this cumulative effect, which relates to the introduction of residential development.

Upper Mole Farmlands Character Area

8.11.9 One Tier 1 CEA development lies within the Upper Mole Farmlands character area on the western fringes of Crawley and separated from Gatwick Airport by 1.5 km of farmland. The addition of an extensive residential development into the rural/urban fringe landscape would form a more developed character area which partially overlaps with the proposed ZTV for the Project. The intrinsic character of the area would become residential edge. No elements of the Project would be developed within this character area. The overall sensitivity of the character area would be low. The construction or completion of CEA development, together with the indirect effect of the construction and operation phase of the Project would result in a high magnitude of change, leading to a **major adverse** level of cumulative landscape effect in the day and at night in the medium term, which would be significant. However, the Project would make no more than a negligible contribution to this cumulative effect.

Low Weald Character Area

8.11.10 Two Tier 3 CEA developments lie within the Low Weald character area on the southern fringes of Horley. The addition of a residential and a commercial development into the Horley urban fringe landscape of residential developments and horse paddocks extending up to the A23 and the edge of Gatwick Airport would form a more developed character area, within which some elements of the Project would be placed. The urban fringe characteristics of the Low Weald would be intensified within this character area as a result of the construction phase or completed cumulative developments. The intrinsic character of the area would remain residential edge and rural fringe on the edge of Gatwick Airport. The contractor compound for the South Terminal roundabout improvements would be located within paddocks on the edge of the Low Weald

character area. The condition of the character area would be ordinary, and the overall sensitivity would be medium. The construction or completion of two CEA developments, together with the direct effect of the construction phase of the compound would result in a high magnitude of temporary change, leading to a **major adverse** level of cumulative landscape effect in the day and at night in the medium term, which would be significant. The Project (primarily the construction and operation of the temporary contractor's compound) would make a medium contribution to this cumulative effect while the construction compound is present. In the long term, when the temporary compound is removed, the Project will make no more than a negligible contribution to the cumulative effect.

Effects on Visual Receptors

8.11.11 The Horley Business Park development west of Balcombe Road and the contractor's compound for the South Terminal roundabout improvements occupy, at least in part, the same parcel of land. Assuming that there is some overlap in the long-term temporary phase of the compound and the construction or operation of the business park, temporary cumulative visual effects would occur. There would be no cumulative visual effects on visual receptors previously identified within this chapter as a result of any other cumulative development and the Project.

Public Right of Way 362a Horley

8.11.12 The Horley Business Park development west of Balcombe Road would be located within the horse paddock immediately south of public right of way 362a, which is represented by Viewpoint 8. The CEA development would obscure views beyond to the Project, either during construction or at completion, preventing any cumulative effects.

Meadowcroft House

8.11.13 Receptors would gain filtered views through boundary vegetation of the Horley Business Park development either during construction or at completion in combination with the contractor's compound for the South Terminal roundabout improvements and vegetation clearance within the A23 corridor. People at their place of work are receptors of low sensitivity to a medium magnitude of change resulting in **minor adverse** cumulative effects during the day and night, for the medium or long term, which would not be significant. The effects on views of the contractor's compound and A23 improvements would make a low contribution to this temporary cumulative effect.

Occupiers of vehicles using the A23/M23 spur and trains on the railway

8.11.14 Occupiers of vehicles travelling on the A23/M23 spur and passengers travelling on the railway would gain views of the Horley Business Park development either during construction or at completion in combination with the contractor's compounds for the North and South Terminal roundabouts and vegetation clearance for the A23 improvements. Occupiers of vehicles and passengers on trains are receptors of low sensitivity to a high magnitude of temporary change resulting in **moderate adverse** effects during the day and night, for the medium or long term, which would not be significant. The views of the Project would make a medium contribution to this cumulative effect.

First Full Year of Operation: 2030 - 2032

Effects on Landscape and Townscape Character

High Woodland Fringes Character Area

8.11.15 The 10 predominantly residential CEA developments within the same High Woodland Fringes character area are likely to be complete by 2030. The 10 developments would contribute to a more developed character area, adjacent to which development at Pentagon Field within Gatwick Airport would be placed. The urban fringe characteristics of the High Woodland Fringes would be considerably intensified within this character area as a result of the cumulative developments. The intrinsic character of the area would be changed in the long term to residential development within a framework of woodland and hedgerows on the edge of Gatwick Airport. The operation of the Pentagon Field decked car park within Gatwick Airport would be on the edge of the High Woodland Fringes character area. The condition of the character area would be ordinary to good and the overall sensitivity would be low to medium. The 10 completed CEA developments, together with the influence of the operational/construction phases of the Project would result in a high magnitude of change, leading to a **major adverse** level of cumulative landscape effect in the day and at night, which would be significant. The Project, which primarily comprises the operation of the decked car park at Pentagon Field, would make a negligible contribution to this cumulative effect.

Upper Mole Farmlands Character Area

8.11.16 One Tier 1 CEA development lies within the Upper Mole Farmlands character area and no elements of the Project. The construction or completion of CEA development, together with the indirect effect of the construction and operation phase of the Project would result in a high magnitude of change, leading to a **major adverse** level of cumulative landscape effect in the day and at night in the medium term, which would be significant. However, the Project would make no more than a negligible contribution to this cumulative effect.

Low Weald Character Area

8.11.17 The addition of a residential and a commercial development as CEA developments into the Horley urban fringe landscape of horse paddocks on the edge of residential developments, extending up to the A23 and the edge of Gatwick Airport would form a more developed character area, within which the temporary contractor compound would be placed. The urban fringe characteristics of the Low Weald would be intensified within this character area as a result of the construction phase or completed cumulative developments. The intrinsic character of the area would remain residential edge and rural fringe on the edge of Gatwick Airport. The contractor compound for the South Terminal roundabout improvements would be developed within paddocks on the edge of the Low Weald character area. The condition of the character area would be ordinary, and the overall sensitivity would be medium. The construction or completion of two CEA developments, together with the direct effect of the operational phase of the compound would result in a high magnitude of change, leading to a **major adverse** level of cumulative landscape effect in the day and at night, which would be significant. The Project, which primarily comprises the construction and operation of the contractor's compound, would make a medium contribution to this long term temporary cumulative effect. In the long term when the temporary compound is removed, the Project will make no more than a negligible contribution to the cumulative effect.

Mole Valley Open Weald Character Area

8.11.18 The two Tier 1 CEA developments lie within the Open Weald character area on the fringes of Charlwood and Hookwood and are separated from Gatwick Airport by approximately 0.3 km of farmland and settlement fringe. The addition of two residential/commercial developments into the rural/urban fringe landscape would form a more developed character area. The intrinsic character of the area would become urban edge. The contractor compound for the improved Longbridge roundabout and attenuation pond would be located within fields on the edge of the Open Weald character area. The overall sensitivity of the character area would be medium. The construction or completion of CEA development, together with the direct effect of the construction and operational phase of the Project would result in a high magnitude of change, leading to a **major adverse** level of cumulative landscape effect in the day and at night in the medium term, which would be significant. However, in the long term, when the landscape proposals at the Longbridge roundabout are mature, the Project would make no more than a negligible contribution to this cumulative effect.

Effects on Visual Receptors

Meadowcroft House

8.11.19 Receptors would gain filtered views through boundary vegetation of the Horley Business Park development either during construction or at completion in combination with the contractor's compound for the South Terminal roundabout improvements and construction of the South Terminal roundabout flyover. People at their place of work are receptors of low sensitivity to a medium magnitude of change resulting in **minor adverse** cumulative effects during the day and night, for the medium or long term, which would not be significant. The views of the Project would make a low contribution to this cumulative effect.

A23/M23 spur and Railway

8.11.20 Occupiers of vehicles travelling on the A23 and passengers travelling on the railway would gain views of the Horley Business Park development either during construction or at completion in combination with the contractor's compound for the South Terminal roundabout and the extensive engineering works for the A23 improvements. Occupiers of vehicles and passengers on trains are receptors of low sensitivity to a high magnitude of temporary change resulting in **moderate adverse** effects during the day and night, for the medium or long term, which would not be significant. The views of the Project would make a medium contribution to this cumulative effect.

Interim Assessment Year: 2033 - 2038

Effects on Landscape and Townscape Character

High Woodland Fringes Character Area

8.11.21 The 10 predominantly residential CEA developments within the same High Woodland Fringes character area would be complete by 2033. The 10 developments would contribute to a more developed character area, adjacent to which, development at Pentagon Field within Gatwick Airport would be placed. The urban fringe characteristics of the High Woodland Fringes would be considerably intensified within this character area as a result of the cumulative developments. The intrinsic character of the area would be changed in the long term to residential development within a framework of woodland and hedgerows on the edge of Gatwick Airport. The completed Pentagon Field decked car park within Gatwick Airport would be on the edge of the High

Woodland Fringes character area. The condition of the character area would be ordinary to good and the overall sensitivity would be low to medium. The 10 completed CEA developments, together with the influence of the operational phase of the Project would result in a high magnitude of change, leading to a **major adverse** level of cumulative landscape effect in the day and at night, which would be significant. The decked car park at Pentagon Field would make a low contribution to this cumulative effect which primarily relates to the introduction of residential development.

Upper Mole Farmlands Character Area

8.11.22 The addition of one CEA development to the Upper Mole Farmlands character area on the western fringes of Crawley would form a more developed character area which partially overlaps with the proposed ZTV for the Project. The intrinsic character of the area would become residential edge. The overall sensitivity of the character area would be low. The construction or completion of CEA development, together with the indirect effect of the construction and operation phase of the Project would result in a high magnitude of change, leading to a **major adverse** level of cumulative landscape effect in the day and at night in the medium term, which would be significant. However, the Project would make no more than a negligible contribution to this cumulative effect.

Low Weald Character Area

8.11.23 The addition of a residential and a commercial development as CEA developments into the Horley urban fringe landscape of horse paddocks on the edge of residential developments, extending up to the A23 and the edge of Gatwick Airport would form a more developed character area, within which the temporary contractor compound would be placed. The urban fringe characteristics of the Low Weald would be intensified within this character area as a result of the construction phase or completed cumulative developments. The intrinsic character of the area would remain residential edge and rural fringe on the edge of Gatwick Airport. The contractor compound for the A23 and South Terminal roundabout would be developed within paddocks on the edge of the Low Weald character area. The condition of the character area would be ordinary, and the overall sensitivity would be medium. The construction or completion of two CEA developments, together with the direct effect of the use of the compound would result in a high magnitude of change, leading to a **major adverse** level of cumulative landscape effect in the day and at night, which would be significant. The Project, which primarily comprises the construction and use of the contractor's compound, would make a medium contribution to this temporary long term cumulative effect. In the long term when the temporary compound is removed, the Project will make no more than a negligible contribution to the cumulative effect.

Mole Valley Open Weald Character Area

8.11.24 The addition of two CEA developments to the Open Weald character area on the fringes of Charlwood and Hookwood, would form a more developed and slightly less rural character area. The Longbridge roundabout improvements would be complete and landscape proposals in place, partially reinstating the character of this area. There would be no long-term cumulative effects on landscape character as a result of the Project.

Effects on Visual Receptors

Meadowcroft House

8.11.25 Receptors would gain filtered views through boundary vegetation of the Horley Business Park development either during construction or at completion in combination with the contractor's compound for the South Terminal roundabout improvements and completed South Terminal roundabout flyover. People at their place of work are receptors of low sensitivity to a medium magnitude of change resulting in **minor adverse** effects during the day and night, for the medium or long term, which would not be significant. The views of the Project would make a low contribution to this cumulative effect.

A23/M23 spur and Railway

8.11.26 Occupiers of vehicles travelling on the A23/M23 spur and passengers travelling on the railway would gain views of the Horley Business Park development either during construction or at completion in combination with the contractor's compound for the South Terminal roundabout improvements and the completed A23 improvements. Occupiers of vehicles and passengers on trains are receptors of low sensitivity to a high magnitude of change resulting in **moderate adverse** effects during the day and night, for the medium or long term, which would not be significant. The views of the Project would make a medium contribution to this cumulative effect.

Design Year: 2038 and Beyond

Effects on Landscape and Townscape Character

High Woodland Fringes Character Area

8.11.27 The 10 predominantly residential CEA developments within the same High Woodland Fringes character area would be complete by 2038 and would contribute to a more developed character area, adjacent to which, development at Pentagon Field and the A23 improvements within Gatwick Airport would be placed. The urban fringe characteristics of the High Woodland Fringes would be considerably intensified within this character area as a result of the cumulative developments. The intrinsic character of the area would be changed in the long term to residential development within a framework of woodland and hedgerows on the edge of Gatwick Airport. The operational Pentagon Field decked car park and A23 corridor within Gatwick Airport would be on the edge of the High Woodland Fringes character area and would include extensive landscape planting proposals that would be reaching maturity and providing beneficial impacts to offset adverse effects of large scale development. The condition of the character area would be ordinary to good and the overall sensitivity would be low to medium. The 10 completed CEA developments, together with the influence of the Project would result in a high magnitude of change, leading to a **major adverse** level of cumulative landscape effect in the day and at night, which would be significant. The decked car park at Pentagon Field and A23 improvements, would, on balance, make a negligible contribution to this cumulative effect.

Upper Mole Farmlands Character Area

8.11.28 The addition of one large CEA development to the Upper Mole Farmlands character area on the western fringes of Crawley would form a more developed character area which partially overlaps with the proposed ZTV for the Project. The intrinsic character of the area would become residential edge. The overall sensitivity of the character area would be low. The construction or completion of CEA development, together with the indirect effect of the operational phase of the

Project would result in a high magnitude of change, leading to a **major adverse** level of cumulative landscape effect in the day and at night in the long term, which would be significant. However, the Project would make no more than a negligible contribution to this cumulative effect.

Low Weald Character Area

8.11.29 By 2038 the temporary contractor compound adjacent to the South Terminal roundabout would be removed from the Low Weald character area and the horse paddocks would be restored. There would no longer be a direct impact on the character area as a result of the Project. The addition of a residential and a commercial development as cumulative developments into the Horley urban fringe landscape of horse paddocks on the edge of residential developments, extending up to the A23 and the edge of Gatwick Airport would form a more developed character area, adjacent to which the improved A23 surface access corridor would be placed. The urban fringe characteristics of the Low Weald would be intensified within this character area as a result of the construction phase or completed CEA developments. The intrinsic character of the area would remain residential edge and rural fringe on the edge of Gatwick Airport. The condition of the character area would be ordinary, and the overall sensitivity would be medium. The construction or completion of two CEA developments, together with the influence of the operational phase of the A23 within the adjoining Gatwick Airport Urban character area would result in a medium magnitude of change, leading to a **moderate adverse** level of cumulative landscape effect in the day and at night, which would not be significant. The Project, which is primarily the operation of the improved A23 within a mature landscape framework, adjacent to the edge of this character area, would make, on balance, a negligible contribution to this cumulative effect in the long term.

Effects on Visual Receptors

Meadowcroft House

8.11.30 Receptors would gain filtered views through boundary vegetation of the Horley Business Park development either during construction or at completion in combination with the completed South Terminal roundabout flyover and mature highway planting. People at their place of work are receptors of low sensitivity to a medium magnitude of change resulting in **minor adverse** cumulative effects during the day and night, for the long term, which would not be significant. The views of the Project would make a negligible contribution to this cumulative effect.

A23/M23 spur and Railway

8.11.31 Occupiers of vehicles travelling on the A23 and passengers travelling on the railway would gain views of the Horley Business Park development either during construction or at completion in combination with the completed A23 improvements within a corridor of mature landscape planting, resembling the existing situation. Occupiers of vehicles and passengers on trains are receptors of low sensitivity to a medium magnitude of change resulting in **minor adverse** effects during the day and night, for the medium or long term, which would not be significant. The views of the Project would make a low contribution to this cumulative effect.

Cumulative Effects on Tranquillity within Nationally Designated Landscapes

8.11.32 There is likely to be a cumulative effect on tranquillity experienced within nationally designated landscapes within the study area as a result of an increase in overflying aircraft from the Project together with overflying aircraft from other airports. However, preliminary conclusions drawn at

this stage are that the cumulative effect would not increase the level of effect previously identified for the Project in Section 8.9 of this chapter.

8.12. Inter-Related Effects

8.12.1 This chapter of the PEIR assesses the effects on landscape and townscape character and visual receptors as a result of the Project. There is an interrelationship with other environmental topics including historic environment, ecology, recreation and noise. Whilst the assessment of effects on character includes land that contains heritage and ecological assets, effects on heritage assets and their context and settings are considered within Chapter 7: Historic Environment and the effects on flora and fauna within habitats is considered within Chapter 9: Ecology and Nature Conservation. Whilst the assessment of effects on visual receptors includes people using recreational assets, effects on public open space and public rights of way are considered within Chapter 18: Agricultural Land Use and Recreation. Whilst the assessment of effects on landscape character and visual resources includes the influence of overflying aircraft on people's perception of tranquillity within the landscape, the effects of aircraft noise on people are considered within Chapter 14: Noise and Vibration. For further information reference Chapter 19: Cumulative Effects and Inter-relationships.

8.13. Summary

Initial Construction Phase: 2024-2029

Landscape and Townscape Character

8.13.1 The construction works associated with the northern runway, reconfiguration/modifications of taxiways, holding areas and stands would temporarily introduce a slightly discordant element into the airport. Two of the construction compounds and the first phase of the CARE facility would introduce small concentrations of discordant elements within the airport. The construction phase and completion of the South Terminal extension, the hotel at the building compound at the car rental location and hotel and multi-storey car park H adjacent to the South Terminal would increase the scale and mass of tall buildings within this cluster. The construction works for the North Terminal IDL, baggage hall and multi-storey car park J would result in changes to prominent buildings and areas within the airport that would be discordant in nature. The clearance of the majority of woodland planting and mature trees as part of the surface access improvements would considerably change this road corridor. The placement of spoil and creation of decked parking at Pentagon Field and replacement Purple Parking at Crawter's Field would result in the loss of relatively large areas of grassland and green infrastructure within the airport leading to **major adverse** and significant effects at Pentagon Field. However, the nature and scale of the range of construction phase activities would not be completely out of character within an operational airport. These activities would occur in combination with the completed large-scale buildings and infrastructure of hotels, decked and multi-storey car parks. Overall, the level of effect on the low sensitivity Gatwick Airport urban character area would be **minor adverse**, during the day and at night, which would not be significant.

8.13.2 The contractor compound north of the South Terminal roundabout would lie within horse paddocks on the urban fringe of Horley within the Low Weald character area north of Gatwick airport. The edge of the low sensitivity character area would temporarily be considerably changed resulting in a **moderate adverse** direct effect during the day and at night, which would not be

significant. An increase in built form within Gatwick Airport would also create a **minor adverse** effect on the wider character area during the day and at night, which would not be significant.

8.13.3 The heavy plant and operations required to undertake construction works, adjacent to the High Woodland Fringes, Upper Mole Farmlands and Open Weald landscapes and Northgate Crawley and Horley townscape character areas would temporarily create slightly discordant elements that would have an influence over the neighbouring landscapes and townscapes however, these would range from **negligible to minor adverse**, which would not be significant.

Visual Amenity

8.13.4 High sensitivity walkers using public rights of way and medium sensitivity pedestrians using the pavement adjacent to Pentagon Field would gain open, near views of construction works and the completed decked car park, resulting in **major adverse** effects in the short to medium term, which would be significant.

8.13.5 High sensitivity walkers using public right of way 362a near the surface access contractor compound at south terminal would gain open views during the construction phase. The magnitude of change would be medium and the level of effect **moderate adverse** during the day and at night, which would not be significant. Occupiers of the Premier Inn hotel adjacent to staff car park Y would gain near views filtered through intervening trees in winter only, of the surface access satellite contractor compound at North Terminal. Occupiers of the Hilton Hotel at South Terminal would gain near views of the new hotel and multi-storey car park at car park H. Medium sensitivity receptors would experience **moderate adverse** effects during the day and at night, which would not be significant. Occupiers of vehicles travelling past the Pentagon Field decked car park would also experience **moderate adverse** effects during the day and night. Low sensitivity occupiers of vehicles travelling on Balcombe Road adjacent to Pentagon Field would gain open, near views of construction works and the completed decked car park, resulting in **moderate adverse** effects in the short to medium term, which would not be significant.

8.13.6 High sensitivity cyclists using the NCR 21 in close proximity to the new hotel at the car rental location would gain open views of the construction phase. The magnitude of change would be low to negligible and the level of effect minor adverse during the day and at night, which would not be significant. The level of effect experienced in the short to medium term by all other receptors within the airport or within the surrounding landscape and townscapes, as a result of mainly construction phase activities and some completed developments within the Project, would be **negligible or minor adverse**, which would not be significant.

First Full Year of Opening: 2030-2032

Landscape and Townscape Character

8.13.7 The operational northern runway, taxiways, stands, substations and decked carparks, terminal extensions, multi-storey car park, hotels at South Terminal and replacement Purple Parking would be typical of the existing airport and would provide an intensification of existing character, although impacts would be minimised through high quality design. The ongoing surface access improvements, CARE facility and North Terminal decked car park and the River Mole diversion and compensation areas would result in the greatest additional direct effect on the character area. The Gatwick Airport urban character area would be of low sensitivity to a medium magnitude of impact. The duration of these effects would range from short term for construction

phase effects to long term for operational phase effects. Overall, the level of effect would be **minor adverse**, during the day and at night, which would not be significant. However, the completed decked car park at Pentagon Field would have a **major adverse** and significant effect on this specific and more sensitive parcel of land.

8.13.8 The contractor compound at the South Terminal roundabout would continue to have **moderate adverse** (direct) effects and **minor adverse** effects (arising from activities outside the character area) on the Low Weald character area, which would not be significant. The Longbridge roundabout compound would lie within a field on the edge of the Mole Valley Open Weald character area. The edge of this low sensitivity character area would temporarily be changed resulting in **moderate adverse** effects during the day and at night, which would not be significant. Construction works for the Longbridge roundabout would also extend into the edge of the Horley townscape character area within the Church Road conservation area. The character area is of medium sensitivity to direct medium impacts during construction, resulting in **moderate adverse** effects.

8.13.9 The operational elements of the Project and the heavy plant and operations required to undertake construction works adjacent to the High Woodland Fringes and Upper Mole Farmlands landscapes and Northgate townscape of Crawley would temporarily create slightly discordant elements that would have an influence over the neighbouring landscapes and townscapes, however these would range from **negligible to minor adverse**, which would not be significant.

Visual Amenity

8.13.10 High sensitivity walkers using public rights of way and pavement at Balcombe Road adjacent to Pentagon Field would continue to gain open, near views of the decked car park, resulting in **major adverse** effects in the long term, which would be significant.

8.13.11 Occupiers of the Hilton Hotel would gain near open views of the new hotel, office and multi-storey car park initially under construction and then when complete resulting in **major adverse** and significant effects. Occupiers of the Premier Inn hotel adjacent to staff car park Y would continue to gain near views of the surface access satellite contractor compound at North Terminal. Walkers using the public right of way at Horley would continue to gain views of the contractor compound, in addition to the construction activities at the South Terminal roundabout. Medium sensitivity receptors would experience **minor to moderate adverse** effects during the day and at night, which would not be significant. Occupiers of vehicles travelling along the A23/M23 would pass through the construction works and occupiers of trains would pass in close proximity. Receptors would gain near views of the construction activities, existing infrastructure and buildings within the airport and the associated contractor compound within a corridor of cleared vegetation. Receptors at north facing windows and outdoor spaces of the KFC and McDonalds at South Terminal and cyclists and visitors on foot at Riverside Garden Park would gain open or filtered views of the A23 construction activities revealed by vegetation clearance. Walkers using public rights of way at Church Meadow Horley would gain near views of the Longbridge roundabout construction compound and completed junction improvements and occupiers of vehicles on Balcombe Road would gain open views of the Pentagon Field decked car park. Receptors in these locations would experience **moderate adverse** effects in the short to medium term, during the day and at night, which would not be significant.

8.13.12 The level of effect experienced in either the short, medium or long term by all other receptors within the airport or within the surrounding landscape and townscapes, as a result of construction

phase activities and completed developments, would be **negligible or minor adverse**, which would not be significant.

Effects on Tranquillity within Nationally Designated Landscapes

8.13.13 The change in the number of overflights at less than 7,000 feet above ground level within the study area as a result of the Project is estimated to be an increase of up to approximately 5% by 2029. It is highly unlikely that receptors would be able to perceive a 5% increase in overflying aircraft following the same flight paths and, therefore, it is considered that any change to the future baseline level of tranquillity in 2029 would be no more than **negligible adverse** and not significant or barely perceptible, equating to a no change situation.

2033 to 2038 (Design Year)

Landscape and Townscape Character

The newly operational elements of the Project, in addition to the development completed in earlier phases, would be typical of those on the existing airport and would provide an intensification of existing character. The construction of large-scale buildings and structures across the airport would result in the greatest direct effect on the Gatwick Airport character area, however the nature and scale of the developments and construction phase activities would not be completely out of character within an operational airport. Overall there would be a general perception of an increase in the scale and mass of large buildings and structures within the airport and A23/M23 corridor and a slight reduction in the extent of green infrastructure. As new mitigation planting matures it would provide a positive addition to the airport and would result in beneficial effects. The duration of these effects would range from short to medium term for construction phase effects to long term for operational phase effects. Overall the level of effect would be **minor adverse**, during the day and at night, which would not be significant. However, the completed Pentagon Field decked car park located within an open grazed field would have a **major adverse** and significant effect on this particular element of the Gatwick Airport character area.

8.13.14 The contractor compound at the South Terminal roundabout would continue to have **moderate adverse** (direct) effects and **minor adverse** effects (from activities outside the character area) on the Low Weald character area, which would not be significant. The Longbridge roundabout improvements would have a high magnitude of impact on a low sensitivity receptor, resulting in a **moderate adverse** effect, which would not be significant.

8.13.15 The operational elements of the Project and the heavy plant and operations required to undertake construction works adjacent to the High Woodland Fringes, Upper Mole Farmlands and Open Weald landscapes and Northgate townscape of Crawley and Horley townscape character areas would temporarily create slightly discordant elements that would have an influence over the neighbouring landscapes and townscapes, however these would range from **negligible to minor adverse**, which would not be significant.

Visual Amenity

8.13.16 There would be no significant adverse effects on visual receptors within the study area by the end of this phase in 2038. Landscape mitigation planting incorporated into many elements of the Project would be of sufficient maturity to provide and attractive setting and screening to offset any adverse effects of new built form. High sensitivity walkers using public rights of way adjacent to Pentagon Field would gain filtered and partially screened views of the completed decked car

park. Pedestrians using the pavement on Balcombe Road would also gain near open views of the construction of Pentagon Field decked car park. Occupiers of rooms on the east facing elevation of the Hilton Hotel would gain near, open views of the South Terminal hotel, office buildings and multi-storey car park H. Walkers on the edge of Horley would gain open views of the surface access contractor compound. The impacts would result in **moderate adverse** effects for each of these receptor groups in the medium to long term, which would not be significant.

8.13.17 Cyclists using the National Cycle Route 21 through Riverside Garden Park would gain filtered views of the A23 construction activities initially and ultimately completed infrastructure and traffic, in the context of maturing new planting. At night the lit corridor would be slightly more prominent in the view against a backdrop of skyglow from the airport. Cyclists are receptors of high sensitivity to a low magnitude of change in the medium to long term, resulting in a **moderate adverse** effect, during the day and at night, which would not be significant. Visitors to the park on foot would experience the same level of effect.

8.13.18 Occupiers of vehicles travelling along the A23 would initially pass through the surface access construction works and then the completed road corridor by the end of the phase and occupiers of trains would pass in close proximity. Receptors would initially gain near views of the activities revealed through vegetation removal, existing infrastructure and buildings within the airport and the associated contractor compound. Receptors at north facing windows and outdoor spaces of the KFC and McDonalds at South Terminal would gain open views of the new A23 roundabout and flyover. Occupiers of residential properties on the southern edge of Horley would gain heavily filtered views of the A23 construction and completion. Receptors in these locations would experience **moderate to negligible adverse** effects in the medium to long term, during the day and at night, which would not be significant

8.13.19 Changes in views as a result of the construction activities at the North Terminal Long Stay decked car park and the North Terminal roundabout and flyover, and the completed South Terminal extension, South Terminal hotel, the hotel at the building compound at the car rental location, office buildings and multi-storey car park H adjacent to the South Terminal would affect visitors to Gatwick. The nature and extent of these activities and developments would form prominent and at times dominant elements within the airport context. Receptors of generally medium to low sensitivity to a medium to high magnitude of change would experience a **minor or moderate adverse** level of effect during the day and at night, which would not be significant.

8.13.20 The operational elements of the Project and the construction activities described above would be visible to members of Gatwick staff working in different locations within the airport or using staff car parks and internal access roads. The construction activities may be barely perceptible when seen at distance, or prominent and at times dominant when in close proximity. The magnitude of change would range from negligible to high resulting in **negligible to moderate adverse** effects, which would not be significant.

8.13.21 The level of effect experienced in the medium to long term by all other receptors within the airport or within the surrounding landscape and townscapes, as a result of construction and operational phase activities, would be **negligible or moderate adverse**, which would not be significant.

Effects on Tranquillity within Nationally Designated Landscapes

8.13.22 Overflying aircraft at less than 7,000 feet above ground level currently form a regular visible or audible feature that forms a discordant influence when experiencing the landscapes of the High

Weald AONB within the study area. Overflying aircraft form a less frequent influence on tranquillity experienced in landscapes of the Surrey Hills AONB, Kent Downs AONB and South Downs National Park. An increase of up to 20% in the number of aircraft following the same flight paths may be discernible to some observers or barely perceptible as an increase to other observers. The magnitude of change would be negligible leading to **minor adverse** effects on the perception of tranquillity during the day and at night, which would not be significant. Some people within the nationally designated landscapes may be unable to perceive the increase in the number of aircraft and would therefore experience no discernible effect to the level of tranquillity.

2038 and Beyond (Landscape Design Year)

Landscape and Townscape Character

8.13.23 The completion and operation of large-scale buildings and structures across the airport would result in the greatest direct impact on the character area, however the nature and scale of the developments would be characteristic of an operational international airport and intensify the character of Gatwick. There would be a continuing change in the level of effects beyond 2038, as a result of the maturing landscape mitigation proposals associated with the CARE facility, the new hangar, Pentagon Field decked car park, offices, hotel, multi-storey car park H, North Terminal long stay decked car park, surface access improvements and Gatwick Steam flood compensation areas. The Gatwick Airport urban character area would be of low sensitivity to a medium magnitude of impact. Overall the level of effect would be **minor adverse**, during the day and at night, which would not be significant. However, the more sensitive rural fringe nature of the Pentagon Field site to the change as a result of the decked car park would result in a high magnitude of impact that cannot be further mitigated through landscape proposals. There would be a **major adverse** effect, which would be significant.

8.13.24 The operational elements of the Project, in conjunction with the mature mitigation, adjacent to the High Woodland Fringes, Mole Valley Open Weald and Low Weald landscapes and Horley townscape character area, would have some influence over the neighbouring landscapes and townscapes however, these would lead to **negligible adverse** effects, which would not be significant.

Visual Amenity

8.13.25 Walkers using public rights of way adjacent to Pentagon Field would gain open, near views of the decked car park as a large-scale addition to the rural fringe, in place of an open field. Cyclists using the National Cycle Route 21 through Riverside Garden Park and people using the open space would gain near views of the operational A23 including signage, lighting and moving traffic, as prominent elements in views which currently include these features. Walkers using the public footpath on the outskirts of Horley would gain prominent views of the new South Terminal roundabout. The impacts would result in **moderate to minor adverse** effects for high sensitivity receptors in the long term in the day and night as mitigation planting matures to soften and screen the Project, which would not be significant.

8.13.26 The operational elements of the Project would be visible to members of Gatwick staff working in different locations within the airport or using staff car parks and internal access roads in the context of a busy international airport. The A23 improvements, including moving traffic, would be largely screened by mature woodland planting in views from locations on the northern edge of the airport. The cluster of buildings at the South Terminal car park H would be visible in the context of

ornamental tree and shrub planting, integrated with the built form. The various elements of the development may be barely perceptible when seen at distance, or prominent and at times dominant when in close proximity. The magnitude of change would range from generally negligible or low to, in some cases high, resulting in generally **negligible to minor adverse** effects with some **moderate adverse** effects, which would not be significant.

8.13.27 Members of the public using the airport access roads and car parks would gain near views of the CARE facility, North Terminal Long Stay decked car park, the new hangar north of Larkins Road, the surface access improvements, the hotel at the building compound at the car rental location, office buildings and multi-storey car park H adjacent to the South Terminal within a framework of mature planting. The nature and extent of these developments would form visible and at times prominent elements within the airport context. The range of receptors in these locations would experience **minor or negligible adverse** level of effect during the day and at night, which would not be significant.

8.13.28 Occupiers of vehicles travelling along the A23 would gain near views of the improved road layout including flyovers within a corridor of mature woodland planting, similar in character to the existing situation. Receptors at north facing windows and outdoor spaces of the KFC and McDonalds at South Terminal would gain open views of the new A23 roundabout and flyover. Pedestrians using the roadside pavement at Balcombe Road adjacent to the Pentagon Field decked cap park would gain filtered or largely screened views of a structure within the rural fringe location. Receptors in these locations would experience **minor to moderate adverse** effects in the long term, during the day and at night, which would not be significant.

8.13.29 The level of effect experienced in the long term by all other receptors within the airport or within the surrounding landscapes and townscapes, as a result of the operation of the airport beyond 2038 would be **negligible or minor adverse**, which would not be significant.

Effects on Tranquillity within Nationally Designated Landscapes

8.13.30 An increase of up to 20% in the number of overflying aircraft following the same flight paths at less than 7,000 feet above ground level may be discernible to some observers or barely perceptible to other observers. The magnitude of change to the level of tranquillity within High Weald AONB, Surrey Hills AONB, Kent Downs AONB and South Downs National Park would be negligible leading to **minor adverse** effects on the perception of tranquillity during the day and at night, which would not be significant. Some people within an AONB may be unable to perceive the increase in the number of aircraft and would therefore experience no discernible effect to the level of tranquillity.

Next Steps

8.13.31 Detailed landscape mitigation proposals will emerge from the iterative design and assessment process to ensure adverse effects on landscape and visual receptors are minimised. The development of the Project design will inform the preparation of more detailed photomontages. These next steps will be set out in the ES.

Table 8.13.1: Summary of Effects

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
Initial Construction Phase 2024-2029 (Construction Effects up to first opening of Northern Runway)							
Gatwick Airport Urban Character Area	Low generally, Medium at Pentagon Field.	Loss of Pentagon Field grazing land for spoil placement and construction of decked parking. Construction phase impact on townscape character generally.	Medium term, temporary and long term permanent	Medium to high	Minor adverse to Major adverse	Not significant/ Significant	Effects are only significant at Pentagon Field, which is a green field site and more sensitive to large scale change than other parts of Gatwick.
Low Weald Character Area	Low	Construction phase impact on landscape character	Long term, temporary	Medium (wider character areas) High (locally)	Minor adverse (wider character area) Moderate adverse (locally)	Not significant	Direct effects of South Terminal surface access construction compound.
High Woodland Fringes Character Area	Low	Construction and operational phase impact on	Medium term, temporary and long term permanent	Low	Negligible to Minor adverse	Not significant	

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
Upper Mole Farmlands Character Area, Mole Valley Open Weald		landscape character					
Northgate Crawley Townscape Character Area	Low	Construction/ operational phase impact on townscape character	Long term, temporary	Low	Minor adverse	Not significant	
Horley Townscape Character Area	Low	Construction phase impact on townscape character	Long term, temporary	Low	Negligible adverse	Not significant	
Gatwick staff and visitors	Low	Visual, construction and operational phase	Medium term, temporary and long term permanent	Negligible to medium	Negligible to moderate adverse	Not significant	
Occupiers of Travelodge, Premier Inn and Hilton Hotel	Medium	Visual, construction and operational phases	Medium term, temporary and long term permanent	Low to medium	Minor to moderate adverse	Not significant	
Walkers using Public right of way	High	Visual, construction/	Medium term, temporary and	Medium	Major adverse	Significant	

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
359/Sy at Pentagon Field		operation of decked car park	long term permanent				
Walkers using public right of way 362a Horley	High	Visual, construction phase	Long term, temporary	Medium (day) Low (night)	Moderate adverse (day) Minor adverse (night)	Not significant	
Walkers using public right of way 360/Sy South Terminal	High	Visual, construction and operational phase	Short term temporary and long term permanent	Medium	Minor adverse (day) Negligible adverse (night)	Not significant	Adverse impacts partly offset by beneficial impacts of improved architectural quality.
Cyclists using NCR 21	High	Visual, construction and operational phase	Medium term, temporary and long term permanent	Negligible to Low	Negligible to Minor adverse	Not significant	
Employees at Roband and Meadowcroft House	Low	Visual, construction/ operational phase	Short term temporary and long term permanent	Medium	Minor adverse	Not significant	
Occupiers of vehicles: Lowfield Heath Road,	Low	Visual, construction phase	Short term temporary and long term permanent	Negligible to medium	Negligible to minor adverse	Not significant	

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
Ifield Road, Railway							
Occupiers of vehicles: Balcombe Road	Low	Visual, construction/ operational phase	Medium term, temporary and long term, permanent	High	Moderate adverse	Not significant	
Pedestrians on Balcombe Road	Medium	Visual, construction/ operational phase	Medium term, temporary and long term, permanent	High	Moderate to Major adverse	Not significant to significant	Significance depending on phase of development.
Mid to long distance views including: Users of rights of way at Rowley Farm, Charlwood, Lowfield Heath Road, Norwood Hill, Turners Hill and Tilgate Hill	High to Medium	Visual, construction and operational phases	Medium term, temporary and long term, permanent	Negligible	Negligible to minor adverse	Not significant	
Perception of tranquillity in nationally	High to Very High	No impact in 2024 to 2029	NA	NA	NA	NA	NA

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
designated landscapes.							
2030-2032 (Construction and Operational Effects)							
Gatwick Airport Urban Character Area	Low generally, medium at Pentagon Field	Loss of Pentagon Field grazing land to decked parking. Construction and operational phase impacts on townscape character generally.	Short to Medium term, temporary and long term permanent	Medium (overall) High (Pentagon Field)	Minor adverse (overall) Major adverse (Pentagon Field)	Not significant/ Significant	
High Woodland Fringes Character Area. Upper Mole Farmlands Character Area.	Low	Construction /operational phase impact on landscape character	Medium term, temporary and long term permanent	Low	Negligible to Minor adverse	Not significant	
Low Weald Character Area and Mole Valley Open	Low	Construction phase impact on	Long term, temporary	Low to High	Negligible to moderate adverse	Not significant	

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
Weald Character Area		landscape character					
Northgate Crawley Townscape Character Area	Low	Construction phase impact on townscape character	Long term, temporary	Low	Minor adverse	Not significant	
Horley Townscape Character Area	Low generally, medium at Riverside Garden Park/Church Road conservation area	Construction phase impact on townscape character	Medium term, temporary	Low to medium	Negligible to Moderate adverse	Not significant	
Gatwick staff and visitors	Low to medium	Visual, construction and operational phase	Medium term, temporary and long term permanent	Negligible to medium	Negligible to minor adverse	Not significant	
Occupiers of Hilton Hotel	Medium	Visual, construction phase	Medium term, temporary and long term permanent	High	Moderate to major adverse	Not significant to significant	

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
Occupiers of Travelodge, Premier Inn, KFC and McDonalds	Medium	Visual, construction phase	Medium term, temporary and long term permanent	Low to medium	Minor to moderate adverse	Not significant	
Walkers using Public right of way 359/Sy at Pentagon Field	High	Visual, operation of decked car park	Long term permanent	Medium	Major adverse	Significant	
Walkers using Public right of way 360/Sy at South Terminal	High	Visual, operation of hotel at building compound at car rental location	Long term, permanent	Medium	Minor adverse (day) Negligible adverse (night)	Not significant	
Walkers using Public right of way at 362a Horley and 574 Church Meadows Horley	High	Visual, construction phase	Medium term, temporary	Medium (day) Low (night)	Moderate adverse (day) Minor adverse (night)	Not significant	
Walkers using River Mole public right of way and occupiers of residential properties at Horley	High	Visual, construction phase	Medium term, temporary	Negligible	Minor adverse	Not significant	

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
Cyclists using NCR 21	High	Visual, construction phase	Short/Medium term, temporary	Low to medium	Minor to moderate adverse	Not significant	
Employees at Roband, Meadowcroft House, Amadeus Building and Schlumberger House, occupiers of McDonalds and KFC	Low	Visual, construction/ operational phase	Medium term, temporary, long term permanent	Low (Roband) Medium (Meadowcroft, Amadeus, Schlumberger)	Minor adverse	Not significant	
Occupiers of vehicles using Lowfield Heath Road, Balcombe Road, Ifield Road and A23 and occupiers of trains using railway	Low	Visual, construction phase	Medium term, temporary, long term permanent	Negligible to high	Negligible to moderate adverse	Not significant	
Pedestrians on Balcombe Road	Medium	Visual, construction phase	Long term, permanent	High	Major adverse	Significant	

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
Mid to long distance views including: Users of rights of way at Rowley Farm, Charlwood, Lowfield Heath Road, Norwood Hill, Turners Hill and Tilgate Hill	High to Medium	Visual, construction and operational phase	Medium term, temporary, long term permanent	Negligible	Negligible to minor adverse	Not significant	
Perception of tranquillity in nationally designated landscapes.	High to Very High	Character/Visual perception during operation	Long term, permanent	Negligible	Negligible	Not significant	
2033-2038 (Construction and Operational Effects)							
Gatwick Airport Urban Character Area	Low generally Medium at Pentagon Field	Loss of Pentagon Field grazing land to decked parking. Construction and operation phase impacts on	Short/Medium/ long term, temporary/ permanent	Medium (overall) High (Pentagon Field)	Minor adverse (overall) Major adverse (Pentagon Field)	Not significant/ Significant	

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
		townscape character generally.					
High Woodland Fringes Character Area. Upper Mole Farmlands Character Area. Mole Valley Open Weald Character Area	Low	Construction phase on landscape character	Medium/ long term, temporary/ permanent	Low to High	Negligible adverse to moderate adverse	Not significant	
Low Weald Character Area	Low	Construction phase on landscape character	Long term, temporary	Medium to High	Minor adverse to moderate adverse	Not significant	
Northgate Crawley Townscape Character Area	Low	Construction phase on townscape character	Long term, temporary	Low	Minor adverse	Not significant	
Horley Townscape Character Area	Medium at Riverside Garden Park, low generally	Construction and operational phase impacts on	Long term, temporary and permanent	Low	Negligible adverse urban edge)	Not significant	

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
		townscape character			Minor adverse Riverside Garden Park		
Gatwick staff and visitors	Low to Medium	Visual, construction/ operational phase	Medium/ long term, temporary/ permanent	Negligible to high	Negligible to moderate adverse	Not significant	
Occupiers of Travelodge, Premier Inn, KFC and McDonalds	Medium	Visual, construction/ operational phase	Medium/ long term, temporary/ permanent	Low to medium	Moderate to minor adverse	Not significant	
Occupiers of Hilton Hotel	Medium	Visual, construction of offices and MSCP H and completed hotel	Medium term, temporary and long term permanent	High	Moderate adverse	Not Significant	
Walkers using Public right of way at River Mole, 360/Sy South Terminal and 362a Horley and 359/Sy at Pentagon Field	High	Visual, construction and operational phase	Medium term, temporary and long term permanent	Negligible to medium	Moderate to Minor adverse (negligible at night time for 360/Sy and 362a) when compound restored)	Not significant	

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
Walkers using Public right of way 360/1Sy at Tinsley Green	High	Visual, construction and operation of Gatwick Stream flood compensation area	Short term, temporary and long term permanent	Low	Moderate	Not significant	
Cyclists using National Cycle Route 21, Riverside Garden Park and visitors to park	High	Visual, construction/ operation of North Terminal roundabout improvements	Medium/long term, temporary/ permanent	Low to medium	Minor to moderate adverse	Not significant	
Walkers using Public right of way 574 Church Meadows Horley	High	Visual, operation of Longbridge roundabout and environmental improvements	Long term, permanent	Low	Negligible	Not significant	Combination of adverse and beneficial effects.
Employees at Roband, Meadowcroft House, Amadeus Building and	Low	Visual, construction/ operational phase	Medium/ long term, temporary/ permanent	Negligible to medium	Negligible to Minor adverse	Not significant	

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
Schlumberger House							
Occupiers of vehicles using Lowfield Heath Road, Balcombe Road, Ifield Road and A23 and occupiers of trains using Railway	Low	Visual, construction/ operational phase	Medium/ long term, temporary/ permanent	Negligible to medium	Negligible to minor adverse	Not significant	
Pedestrians using Balcombe Road, Pentagon Field	Medium	Visual, operation of decked car park	Long term, permanent	Medium	Moderate adverse	Not significant	
Horley residents	High	Visual, construction/operation phase	Medium/long term, temporary	Negligible	Minor adverse	Not significant	
Mid to long distance views including: Users of rights of way at Rowley Farm, Charlwood, Lowfield Heath	High to medium	Visual, construction/ operational phase	Medium/ long term, temporary/ permanent	Negligible	Negligible to minor adverse	Not significant	

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
Road, Norwood Hill, Turners Hill and Tilgate Hill							
Perception of tranquillity in nationally designated landscapes.	High to Very High	Character/Visual perception during operation	Long term, permanent	Negligible	Minor adverse	Not significant	
Design Year 2038 and beyond (Operational Effects)							
Gatwick Airport Urban Character Area	Medium at Pentagon Field, Low generally	Loss of Pentagon Field grazing land for decked parking. Operational phase impacts on townscape character generally.	Long term, permanent	Medium (overall) High (Pentagon Field)	Minor adverse (overall) Major adverse (Pentagon Field)	Not significant/ Significant	
Low Weald Character Area. High Woodland Fringes Character Area.	Low	Landscape character operational phase	Long term, permanent	Negligible to Medium	Neutral to Minor adverse	Not significant	

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
. Mole Valley Open Weald Character Area							
Northgate Crawley Townscape Character Area	Low	Townscape character operational phase	No Change	No Change	Neutral	Not significant	
Horley Townscape Character Area	Low to Medium	Townscape character operational phase	Long term, permanent	Negligible	Negligible	Not significant	
Gatwick staff and visitors	Low to Medium	Visual, A23 improvements, hotels, car parks and terminals	Long term, permanent	Negligible to high	Negligible to moderate adverse	Not significant	
Occupiers of KFC and McDonalds	Medium	Visual, A23 improvements	Long term, permanent	Low	Minor adverse	Not significant	
Occupiers of Hilton Hotel	Medium	Visual, South Terminal Hotel, MSCP H and offices	Long term, permanent	Medium	Moderate adverse	Not significant	
Employees at Meadowcroft House, Amadeus Building and	Low	Visual, A23 improvements	Long term, permanent	Low to medium	Negligible to minor adverse	Not significant	

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
Schlumberger House							
Walkers using Public right of way360/1Sy at Tinsley Green, River Mole, Horley and South Terminal and 359/Sy at Pentagon Field and 236a at Horley	High	Visual, A23 improvements, water drainage feature, decked car park or North terminal Hotel	Long term, permanent	Negligible to medium	Minor to moderate adverse	Not significant	
Walkers using Public right of way 574 at Horley	High	Visual, Longbridge roundabout improvements	Long term, permanent	Low	Minor beneficial	Not significant	
Cyclists using National Cycle Route 21, Riverside Garden Park and visitors to park	High	Visual, A23 improvements	Long term, permanent	Low	Moderate adverse (winter) Minor adverse (summer)	Not significant	
Occupiers of vehicles using Lowfield Heath Road,	Low	Visual, A23 improvements or decked car park	Long term, permanent	Negligible to low	Negligible to minor adverse	Not significant	

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
Balcombe Road, Ifield Road and A23 and occupiers of trains using Railway							
Pedestrians using pavement at Balcombe Road	Medium	Visual, decked car park Pentagon Field	Long term, permanent	Low	Minor to Moderate adverse	Not significant	
Horley residents	High	Visual, A23 improvements	Long term, permanent	Negligible	Minor adverse	Not significant	
Mid to long distance views including: Users of rights of way at Rowley Farm, Charlwood, Lowfield Heath Road, Norwood Hill, Turners Hill and Tilgate Hill	High to medium	Visual operational phase	Long term permanent	Negligible	Negligible to minor adverse	Not significant	
Perception of tranquillity in nationally	High to Very High	Character/Visual perception during operation	Long term, permanent	Negligible	Minor adverse	Not significant	

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
designated landscapes.							

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8.15. Glossary

Table 8.15.1: Glossary of Terms

Term	Description
AOD	Above Ordnance Datum
AONB	Area of Outstanding Natural Beauty
CAP	Civil Aviation Policy
CARE	Central Airfield Maintenance and Recycling Facility
CEA	Cumulative Effects Assessment
CPRE	Campaign for the Protection of Rural England
DMRB	Design Manual for Roads and Bridges
EIA	Environmental Impact Assessment
ES	Environmental Statement
GAL	Gatwick Airport Limited
GLVIA	Guidelines for Landscape and Visual Impact Assessment
IDL	International Departure Lounge
ITTS	Inter-Terminal Transit System
LCT	Landscape Character Type
LVIA	Landscape and Visual Impact Assessment
NPPF	National Planning Policy Framework
NPPG	National Planning Practice Guidance
NPR	Noise Preferential Route
NPS	National Policy Statement
PEIR	Preliminary Environmental Information Report
RVAA	Residential Visual Amenity Assessment
SPD	Supplementary Planning Document
ZoI	Zone of Influence
ZTV	Zone of Theoretical Visibility

Preliminary Environmental Information Report
Chapter 9: Ecology and Nature Conservation

September 2021

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9 Ecology and Nature Conservation

9.1. Introduction

9.1.1 This chapter of the Preliminary Environmental Information Report (PEIR) presents the findings of the Environmental Impact Assessment (EIA) work undertaken to date concerning the potential effects of the proposal to make best use of Gatwick's existing runways (referred to within this report as 'the Project') on ecology and nature conservation.

9.1.2 This chapter identifies the potential effects of the Project on the ecology and nature conservation interest of the Project site and surrounding receptors.

9.1.3 In particular, this PEIR chapter:

- sets out the existing and future environmental baseline conditions, established from desk studies, surveys and consultation to date;
- presents the potential environmental effects on ecology and nature conservation arising from the Project, based on the information gathered and the analysis and assessments undertaken to date;
- identifies any assumptions and limitations encountered in compiling the environmental information; and
- highlights any necessary monitoring and/or mitigation measures that could prevent, minimise, reduce or offset the possible environmental effects identified in the EIA process.

9.1.4 This chapter is accompanied by the following appendices:

- Appendix 9.3.1: Summary of Stakeholder Consultation;
- Appendix 9.2.1: Ecology and Nature Conservation Legislation;
- Appendix 9.2.2: Summary of Local Planning Policy;
- Appendix 9.6.1: Ecological Desk Study;
- Appendix 9.6.2: Ecology Survey Report;
- Appendix 9.6.3: Bat Trapping and Radio Tracking Surveys; and
- Appendix 9.9.1: Habitats Regulations (No Significant Effects) Report.

9.1.5 The PEIR will inform pre-application consultation. Following consultation, comments on the PEIR will be reviewed and taken into account in preparation of the Environmental Statement (ES) that will accompany the application to the Planning Inspectorate for development consent.

9.2. Legislation and Policy

Legislation

9.2.1 A range of legislation provides protection to habitats and species at an international, national and local level. Full details of the legislation relevant to this Project are provided in Appendix 9.2.1.

9.2.2 Key legislation relevant to ecology and nature conservation includes:

- The Conservation of Habitats and Species Regulations 2017, as amended;
- The Wildlife and Countryside Act (WCA) 1981 (as amended);
- Countryside and Rights of Way (CRoW) Act 2000;

- The Natural Environment and Rural Communities (NERC) Act 2006;
- The Protection of Badgers Act 1992;
- Wild Mammals Protection Act 1996; and
- The Hedgerow Regulations 1997.

Planning Policy Context

National Policy Statements

9.2.3 The Airports National Policy Statement (NPS) (Department for Transport, 2018), although primarily concerned with a new runway at Heathrow Airport, remains a relevant consideration for other applications for airport infrastructure in London and the south east of England.

9.2.4 The 'Biodiversity and Ecological Conservation' section of the Airports NPS summarises the UK Government's biodiversity strategy (paragraph 5.84). The aim of the strategy is to *'halt biodiversity loss, support healthy, well-functioning ecosystems, and establish coherent ecological networks, with more and better places for nature for the benefit of wildlife and people*.'

9.2.5 This strategy is followed through the Airports NPS by reference to the National Planning Policy Framework (NPPF) which supports a movement from net loss of biodiversity, through an interim stage of no net loss and on to achieving net gains for nature (paragraph 5.85).

9.2.6 The NPS for National Networks (Department for Transport, 2015)[1] sets out the need for development of road, rail and strategic rail freight interchange projects on the national networks and the policy against which decisions on major road and rail projects will be made. This has been taken into account in relation to the highway improvements proposed as part of the Project.

9.2.7 Table 9.2.1 provides a summary of the relevant requirements of the Airports NPS and NPS for National Networks and how these are addressed within the PEIR.

Table 9.2.1: Summary of NPS Information Relevant to this Chapter

Summary of NPS Requirement	How and Where Considered in the PEIR
Development should avoid significant harm to biodiversity and geological conservation interests, including through mitigation and consideration of reasonable alternatives. The applicant may also wish to make use of biodiversity offsetting in devising compensation proposals to counteract any impacts on biodiversity which cannot be avoided or mitigated. Where significant harm cannot be avoided or mitigated, as a last resort appropriate compensation measures should be sought (Airports NPS Para. 5.96 and NPS for NN Para. 5.25).	Relevant baseline data have been collected to determine ecology features of concern, and to inform the assessment of effects, which sets out effects on designated sites, protected species and habitats and other species identified as being of principal importance for the conservation of biodiversity. The Project has taken into account the need to protect biodiversity and prevent significant harm. Mitigation measures described in this chapter and adopted as part of the Project include measures to protect and minimise the potential for effects on biodiversity. Details of compensation

[1]It is noted that the Transport Decarbonisation Plan published by Department for Transport (DfT) on 14 July 2021 announced DfT's intention to review the NPS for National Networks in due course once demand patterns post-pandemic become clearer. It is understood DfT intends to commence the review by the end of 2021 and complete it by Spring 2023. In the interim and whilst the review is undertaken, DfT has confirmed the NPS for National Networks remains relevant government policy and has full force and effect for the purposes of the Planning Act 2008.

Summary of NPS Requirement	How and Where Considered in the PEIR
	measures are provided where they are required as a last resort. Biodiversity losses will be calculated based on the design of the Project (including ancillary services, temporary works areas and linked transport infrastructure). All terrestrial and freshwater habitats that would be lost to development will be included within the biodiversity offsetting calculations that will be provided in the ES. Mitigation measures proposed as part of the Project are set out within this chapter and include habitat creation around the Project site, which would contribute to the overall effect in relation to biodiversity (Section 9.8).
Appropriate weight is attached to designated sites of international, national and local importance, protected species, habitats and other species of principal importance for the conservation of biodiversity, and to biodiversity and geological interests within the wider environment (Airports NPS Para. 5.97 and NPS for National Networks Para. 5.25).	The ecology and nature conservation value of sites, species and habitats identified within the Project site boundary and within the relevant study area has been assessed and are explained in this chapter (Section 9.6). The value of each feature has informed the assessment of effects for the Project (Section 9.9).
The Secretary of State will ensure that the applicant's proposals to mitigate the harmful aspects of the development on Sites of Special Scientific Interest (SSSI) and, where possible, to ensure the conservation and enhancement of a SSSI's biodiversity or geological interest, are acceptable. Where necessary, requirements and / or planning obligations should be used to ensure these proposals are delivered (Airports NPS Para. 5.101 and NPS for National Networks Para. 5.29).	The Project would have no direct effect on SSSIs. Mitigation measures adopted as part of the Project for ecology and nature conservation are described in this chapter (Section 9.8). Measures include following best practice guidelines to ensure there is no significant effect on SSSIs.
Sites of regional and local biodiversity interest (which include Local Nature Reserves, Local Wildlife Sites and Nature Improvement Areas) have a fundamental role to play. The Secretary of State will give due consideration to such regional or local designations. Adequate compensation should always be considered, and ecological corridors and their physical processes should be maintained as a priority to mitigate widespread impacts (Airports NPS Para. 5.102 and NPS for National Networks Para. 5.31).	The Project would have no direct effect on Local Nature Reserves or Local Wildlife Sites due to the mitigation measures that would be put in place. Where practicable, opportunities to enhance the Project site for the benefit of biodiversity have been included in the design of the Project and are set out in this chapter (Section 9.8). These have been informed by baseline surveys (Section 9.6 and Appendix 9.6.2). The loss or covering of lengths of rivers and streams will be accounted for within the biodiversity offsetting metric described above. Due to the nature of rivers and

Summary of NPS Requirement	How and Where Considered in the PEIR
	streams, the potential to create multiple lengths of new channel is limited due to the hydrological effects that this would create in other areas of the catchment. Therefore, biodiversity gains for rivers and streams include restoration of existing watercourses, as well as any relevant channel creation. Restoration, where possible, would be targeted within the same rivers and streams in both upstream and downstream sections.
Ancient woodland is a valuable biodiversity resource both for its diversity of species and for its longevity as woodland. The Secretary of State should not grant development consent for any development that would result in the loss or deterioration of irreplaceable habitats including ancient woodland and the loss of aged or veteran trees found outside ancient woodland, unless the national need for and benefits of the development, in that location, clearly outweigh the loss. Where such trees would be affected by development proposals, the applicant should set out proposals for their conservation or, where their loss is unavoidable, the reasons for this (Airports NPS Para. 5.103 and NPS for National Networks Para. 5.32).	A series of species and habitat surveys have been undertaken in order to inform this assessment of effects. These are reported in Section 9.6 and Appendix 9.6.2. Opportunities to avoid effects on these features and habitats have been taken during the site selection process and mitigation measures have been designed into the Project to avoid effects on ancient woodland. These are reported in the Section 9.8.
The Secretary of State will consider whether the applicant has maximised opportunities for building in beneficial biodiversity as part of good design in and around developments, and particularly to establishing and enhancing green infrastructure (Airports NPS Para. 5.104 and NPS for National Networks Para. 5.33).	Where practicable, opportunities to enhance the Project site for the benefit of biodiversity have been included in the design of the Project and are set out in this chapter (Section 9.8). These have been informed by baseline surveys (Section 9.6 and Appendix 9.6.2). Opportunities for building in beneficial biodiversity in the Project design have been sought and these have included opportunities to establish and enhance green infrastructure.
In addition to the habitats and species that are subject to statutory protection or international, regional or local designation, other habitats and species have been identified as being of principal importance for the conservation of biodiversity in England and Wales and therefore requiring conservation action. The Secretary of State will ensure that the applicant has taken measures to ensure that these other habitats and species are protected from the adverse effects of development. Where appropriate, requirements or planning obligations may be used in order to deliver this	The assessment provided in this chapter considers designated sites, habitats and protected and otherwise notable species throughout the chapter, including species and habitats identified as being of principal importance.

Summary of NPS Requirement	How and Where Considered in the PEIR
protection (Airports NPS Para. 5.105 and NPS for National Networks Para. 5.35).	
Appropriate mitigation measures should be included as an integral part of a proposed development, including identifying where and how these will be secured. The Secretary of State should consider what appropriate requirements should be attached to any consent and/or in any planning obligations entered into in order to ensure that mitigation measures are delivered (NPS for National Networks Para. 5.35).	This assessment provides details of the mitigation measures that have been designed into the Project (Section 9.8).

National Planning Policy Framework

9.2.8 The National Planning Policy Framework (NPPF) (Ministry of Housing, Community and Local Government, 2021) sets out the planning policies for England and is a material consideration in planning decisions.

9.2.9 The principle of sustainable development in the NPPF acknowledges the environmental role of planning in protecting and enhancing the natural environment and helping to improve biodiversity. The NPPF recognises that achieving sustainable development involves pursuing positive improvements in the natural environment.

9.2.10 Chapter 15 of the NPPF 'Conserving and enhancing the natural environment' contains provisions for ensuring that planning can be sustainable from an environmental perspective. Specifically, paragraph 174 states that:

'...Planning policies and decisions should contribute to and enhance the natural and local environment by:

- *protecting and enhancing valued landscapes, sites of biodiversity or geological value and soils (in a manner commensurate with their statutory status or identified quality in the development plan);*
- *recognising the intrinsic character and beauty of the countryside, and the wider benefits from natural capital and ecosystem services – including the economic and other benefits of the best and most versatile agricultural land, and of trees and woodland;*
- *maintaining the character of the undeveloped coast, while improving public access to it where appropriate;*
- *minimising impacts and providing net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures;*
- *preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air quality, taking into account relevant information such as river basin management plans; and*
- *remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate.'*

9.2.11 Paragraph 180 goes on to state that:

'When determining planning applications, local planning authorities should apply the following principles:

- *if significant harm to biodiversity resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused;*
- *development on land within or outside a Site of Special Scientific Interest, and which is likely to have an adverse effect on it (either individually or in combination with other developments), should not normally be permitted. The only exception is where the benefits of the development in the location proposed clearly outweigh both its likely impact on the features of the site that make it of special scientific interest, and any broader impacts on the national network of Sites of Special Scientific Interest;*
- *development resulting in the loss or deterioration of irreplaceable habitats (such as ancient woodland and ancient or veteran trees) should be refused, unless there are wholly exceptional reasons and a suitable compensation strategy exists; and*
- *development whose primary objective is to conserve or enhance biodiversity should be supported; while opportunities to improve biodiversity in and around developments should be integrated as part of their design, especially where this can secure measurable net gains for biodiversity or enhance public access to nature where this is appropriate*.'

9.2.12 The NPPF also states (paragraph 182) that '*the presumption in favour of sustainable development does not apply where the plan or project is likely to have a significant effect on a habitats site (either alone or in combination with other plans or projects), unless an appropriate assessment has concluded that the plan or project will not adversely affect the integrity of the habitats site.*'

9.2.13 The NPPF is supported by the Government Circular: Biodiversity and Geological Conservation – Statutory Obligations and their Effect within the Planning System, jointly issued by the Office of the Deputy Prime Minister and the Department for Environment, Food and Rural Affairs (Defra) (ODPM, Defra, 2005). This joint circular aims to provide '*guidance on the application of the law in relation to planning and nature conservation as it applies in England*.'

9.2.14 The Government Circular makes reference to the UK Biodiversity Action Plan (BAP), England Biodiversity Strategy and Local Biodiversity Partnerships. These documents outline strategic actions for biodiversity at both the national and local level and are considered further below under Wildlife Legislation.

9.2.15 In June 2021, the government published a proposed amendment to the Environment Bill to include a biodiversity net gain requirement for nationally significant infrastructure projects (NSIPs). It is likely that the requirement to deliver biodiversity net gain will be through the relevant NPS or through separate sector-specific statements.

National Planning Practice Guidance

9.2.16 The National Planning Practice Guidance (NPPG) (Ministry of Housing, Communities and Local Government, 2019) supports the NPPF and provides guidance across a range of topic areas.

9.2.17 The guidance states that the planning system should conserve and enhance the natural and local environment and requires local planning authorities to consider the opportunities that proposed developments may provide to conserve and enhance biodiversity and contribute to habitat connectivity in the wider area.

Local Planning Policy

9.2.18 Gatwick Airport is located in the county of West Sussex and immediately adjacent to the bordering county of Surrey. Gatwick Airport lies within the administrative area of Crawley Borough Council and adjacent to the boundaries of Mole Valley District Council to the north west, Reigate and Banstead Borough Council to the north east and Horsham District Council to the south west. The administrative area of Tandridge District Council is located approximately 1.9 km to the east of Gatwick Airport, while Mid Sussex District Council lies approximately 2 km to the south east.

9.2.19 The relevant local planning policies applicable to ecology and nature conservation based on the extent of the study area for this assessment are summarised in Table 9.2.2, with further details provided in Appendix 9.2.2.

Table 9.2.2: Local Planning Policy

Administrative Area	Plan	Policy
Adopted Policy		
Crawley	Crawley 2030: Crawley Borough Local Plan 2015-2030 (2015)	ENV2: Biodiversity
Reigate and Banstead	Reigate and Banstead Local Plan: Core Strategy 2014	CS2: Valued Landscapes and the Natural Environment
	Reigate and Banstead Local Plan Development Management Plan 2018-2027 (2019)	NHE2: Protecting and Enhancing Biodiversity and Areas of Geological Importance
		NHE3: Protecting Trees, Woodland and Natural Habitats
		NHE4: Green and Blue Infrastructure
Tandridge	Tandridge District Core Strategy 2008	CSP17: Biodiversity
	Tandridge District Core Strategy 2008. Tandridge Local Plan. Part 2: Detailed Policies 2014-2029 (2014)	DP19: Biodiversity, Geological Conservation and Green Infrastructure
Mid Sussex	Mid Sussex District Plan 2014-2031 (2018).	DP17: Ashdown Forest SPA and SAC
		DP36: Historic Parks and Gardens
		DP37: Trees, Woodland and Hedgerows
		DP38: Biodiversity
		C5: Areas of Importance for Nature Conservation

Administrative Area	Plan	Policy
	Mid Sussex Local Plan 2004 (saved policies)	C6: Trees, Hedgerows and Woodlands
Horsham	Horsham District Planning Framework (2015)	Policy 25: The Natural Environment and Landscape Character
		Policy 31: Green Infrastructure & Biodiversity
Mole Valley	Mole Valley Core Strategy 2009	CS15: Biodiversity and Geological Conservation
	Mole Valley Local Plan 2000	ENV11: Local and non-statutory nature reserves
		ENV12: Sites of Nature Conservation Importance and Potential Sites of Nature Conservation Importance
		ENV13: Features of Local Importance for Nature Conservation
		ENV14: Enhancement, management and creation of nature conservation features
		ENV15: Species Protection
Emerging Policy		
Crawley	Draft Crawley Borough Local Plan 2021-2037 (2021)	GI1: Green Infrastructure
		GI2: Biodiversity Sites
		GI3: Biodiversity and Net Gain
		SD1: Presumption in Favour of Sustainable Development
Mole Valley	Future Mole Valley 2018-2033 Consultation Draft Local Plan (2020)	EN9: Enhancing Biodiversity EN11: Green Infrastructure and Play Space
Horsham	Draft Horsham District Local Plan 2019-2036 (2020)	Strategic Policy 27 - The Natural Environment and Landscape Character Strategic Policy 31 - Green Infrastructure and Biodiversity
Tandridge	Our Local Plan 2033 (2019)	TLP35: Biodiversity, Ecology & Habitats
		TLP36: Ashdown Forest SPA

9.3. Consultation and Engagement

9.3.1 In September 2019, Gatwick Airport Limited (GAL, 2019) submitted a Scoping Report to the Planning Inspectorate, which described the scope and methodology for the technical studies being undertaken to provide an assessment of any likely significant effects and, where necessary, to determine suitable mitigation measures for the construction and operational phases of the Project. It also described those topics or sub-topics which are proposed to be scoped out of the EIA process and provided justification as to why the Project would not have the potential to give rise to significant environmental effects in these areas.

9.3.2 Following consultation with the statutory bodies, the Planning Inspectorate (on behalf of the Secretary of State) provided a Scoping Opinion on 11 October 2019 (Planning Inspectorate, 2019).

9.3.3 Key issues raised during the scoping process specific to ecology and nature conservation are listed in Table 9.3.1, together with details of how these issues have been addressed within the PEIR.

Table 9.3.1: Summary of Scoping Responses

Details	How/Where Addressed in PEIR
Planning Inspectorate	
Notes the potential need to carry out an assessment under The Conservation of Habitats and Species Regulations 2017 (now amended by The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019) (the Habitats Regulations). This assessment must be coordinated with the EIA in accordance with Regulation 26 of the EIA Regulations. The Applicant's ES should therefore be coordinated with any assessment made under the Habitats Regulations	The need for assessment under the Habitats Regulations has been considered throughout the EIA process. The findings of this are presented in Appendix 9.9.1: Habitats Regulations (Non-significant Effects) Report.
The Scoping Report includes no evidence relating to wintering birds, amphibians and terrestrial mammals. For the avoidance of doubt the ES should assess the impacts to these ecological receptors where a likely significant effect could occur.	Surveys have been undertaken for wintering birds, amphibians and terrestrial mammals and survey results are reported in Section 9.6. Effects are reported in Section 9.9.
The Scoping Report does not provide information demonstrating an absence of hydrological pathways from the Proposed Development to European Designated sites. In absence of such information the Inspectorate cannot agree to scope this matter out. The ES should include an assessment of the impacts from dust or changes in water quality at European Designated sites where significant effects are likely to occur.	An assessment of effects on European designated sites is provided within Section 9.9 of this chapter and within the Habitats Regulations (Non-significant Effects) Report included in Appendix 9.9.1, which considers the potential for effects on European designated sites.
Biodiversity Opportunity Areas (BOAs) and Sites of Nature Conservation Importance (SNCIs) are not listed as locally designated sites to be included in the ES assessment. The ES should include these sites as potential ecological receptors in the assessment of significant effects	SNCIs are included as locally designated sites within this assessment (see Appendix 9.6.1 and Table 9.6.1). No details of BOAs were provided as part of the desk study exercise. Further information has been requested which will be included within the ES.
The ES should include an assessment of the potential impacts to ecology from changes in watercourse flows and drainage systems during the construction and operation of the Proposed Development.	The ecological assessment provided in this chapter has taken into consideration the hydrological

Details	How/Where Addressed in PEIR
The Inspectorate recognises the degree of overlap between the ecological and hydrological assessment in this regard and therefore that there will need to be a degree of overlap and cross referencing between these aspects.	assessment set out in Chapter 11: Water Environment.
It remains unclear whether fish species are scoped in or out of the ES as the Scoping Report determines that fish surveys are only to be undertaken should the Proposed Development warrant direct works or changes to watercourses. The ES should scope fish species in to the assessment and assess both indirect impacts and direct impacts on such species; this should cross refer to other assessments in the ES such as the Water Environment.	Fish surveys of the River Mole have been undertaken and are reported in Appendix 9.6.2, with an assessment of effects in Section 9.9.
The Scoping Report omits ancient and veteran trees as sensitive habitats that should be assessed. However, the Scoping Report does not provide evidence to suggest they are not present within the study area. Figures 5.2.1(e and f) indicate potential areas for flood compensation and construction compounds respectively adjacent to ancient woodland areas as identified by the Forestry Commission. The ES should consider the potential impacts and disturbance within the buffer zone of the ancient woodland and consider appropriate mitigation. Site investigations should be carried out to determine whether they are present within the study area of the Proposed Development and if so, impacts to ancient and veteran trees and ancient woodland should be assessed where significant effects are likely to occur and mitigation measures proposed where necessary.	No ancient or veteran trees that would be affected by the Project were identified during the Phase 1 habitat survey. Ancient woodland was identified within the Project site boundary and is reported in the desk study report at Appendix 9.6.1 and summarised in Section 9.6. Mitigation measures designed into the Project to avoid effects on ancient woodland are described in Table 9.8.1 and potential effects are described in Section 9.9. Opportunities to avoid effects on these features and habitats have been taken during the site selection process (see Chapter 3: Need and Alternatives).
The assessment of ecological effects in the ES should be undertaken in accordance with the new, updated CIEEM Ecological Impact Assessment Guidelines published in September 2019.	The assessment is based on the 2019 guidance.
The definitions of notable species and habitats should be refined in the ES and include 'priority' species and habitats in line with the NERC Act 2006. Additionally, any mitigation and monitoring measures considered should account for the identified priority habitats and species where appropriate.	Priority habitats and species have been identified as Important Ecological Features in Table 9.6.2 and any potential effects on them are described in Section 9.9.
The Scoping Report doesn't explain in detail how the Proposed Development's Zone of Influence (ZoI) has been determined and how it relates to the study areas applied in the ecological assessments (2 km for protected species, 500 metres up and downstream for aquatic fauna). Potential impacts to the Thames Basin Heaths Special Protection Area (SPA) have also apparently been omitted. The	The ZoI for the Project was determined based on the Guidelines for Ecological Impact Assessment in the UK and Ireland (CIEEM, 2019) combined with that adopted in previous studies in relation to expansion at Gatwick, work

Details	How/Where Addressed in PEIR
Applicant should ensure that any assessments in the ES relate to the extent of the ZoI and ensure that all potential impacts with a likely significant effect on sensitive receptors are assessed.	undertaken by the Airports' Commission in respect of a second runway, in particular. However, as noted in the Scoping Report (para 7.3.8), the study area (and hence ZoI) for both protected species (bats, in particular) and designated sites responds to the findings of both survey work and other modelling of traffic flows with the ZoI adjusted accordingly. Impacts to the Thames Basin Heaths SPA have been considered and are reported within Appendix 9.9.1: Habitats Regulations (Non-significant Effects) Report.
The Scoping Report proposes that anticipated change in traffic flows on routes serving the site, will be an indicator of impacts for the purposes of the assessment. Ecologically designated sites within 200 metres of these routes will be included within the study area. In the ES assessment, this should also include habitats and protected species.	The effects of changes in traffic flows on sites and habitats/species they support are considered in Section 9.9.
The ES should explain which species are regarded as being 'mobile' for the purposes of the assessment. Surveys are proposed for bats, aquatic mammals and potentially fish but surveys for other relevant mobile species should be undertaken, particularly in relation to birds located within the Proposed Development's ZoI.	Surveys have been undertaken for a range of species that could potentially be affected by the Project, if present. This includes surveys for mobile species and include wintering and breeding bird surveys. The survey findings are provided in Section 9.6.
The Scoping Report provides sparse detail on the mitigation proposed and uses vague wording such as 'may' meaning it remains unclear what mitigation is proposed where. The ES should clearly present the mitigation required to address significant effects and ensure this is secured appropriately, eg as part of a landscaping and ecological management plan to be secured by requirements in the DCO. Draft or finalised management plans should be provided with the ES.	Details of mitigation measures designed into the Project at this stage are described in Table 9.8.1. This will be developed further for the ES (including the provision of draft/outline management plans where appropriate).
Impacts resulting from implementation of proposed mitigation should be assessed where significant effects may occur. This is particularly relevant to proposed bird mitigation measures and the potential for collision risk. The Applicant should make efforts to ensure that mitigation areas do not result in increased hazards to air traffic.	Details of mitigation measures designed into the Project at this stage are described in Table 9.8.1. These have been designed in consultation with the airport's Bird Hazard

Details	How/Where Addressed in PEIR
	Management team to ensure no increased risk to air traffic.
Monitoring of the effects of nitrogen deposition should be included in the proposed/ongoing surveys to inform the assessment of likely significant effects and any subsequent remedial measures for the ES, particularly for receptors sensitive to such changes including (but not limited to) Ashdown Forest Special Area of Conservation (SAC) and Special Protection Area (SPA), Mole Gap and Reigate escarpment SAC, botanical receptors and areas of ancient woodland/notable trees.	Effects on European designated sites are provided within Section 9.9 of this chapter and within the Habitats Regulations (Non-significant Effects) Report included in Appendix 9.9.1. Effects on ancient woodland and notable trees are assessed in Section 9.9.

9.3.4 Key issues raised during consultation and engagement with interested parties specific to ecology and nature conservation are listed in Table 9.3.2, together with details of how these issues have been addressed within the PEIR.

Table 9.3.2: Summary of Consultation

Consultee	Date	Details	How/where addressed in PEIR
Natural England meetings via Discretionary Advice Service	15/04/2019	Proposed survey methodology with respect to protected species with particular focus on bats discussed.	The survey methodologies were devised considering advice provided by Natural England. The methodologies are described in paragraphs 9.4.14 to 9.4.61.
		Potential scope of Habitats Regulations Assessment (HRA), including with respect to effects of changes to air quality on sites in surrounding landscape and effects on SACs designated for bat interest.	The scope of the No-Significant Effects Report considered the advice provided by Natural England. The report is provided in Appendix 9.9.1.
	28/01/2020	Scope of HRA with respect to air quality	The scope of the No-Significant Effects Report considered the advice provided by Natural England. The report is provided in Appendix 9.9.1.
	13/02/2020	Survey results in 2019 and approach to pre-commencement surveys. Agreed ES would be based on data collected in 2019 and updated as necessary pre-commencement.	Surveys will be updated pre-commencement, as required.

Consultee	Date	Details	How/where addressed in PEIR
	24/05/2021	Project re-start and re-engagement with NE	N/A
	21/06/2021	Scope of HRA with respect to which designated sites to include, following expansion of traffic modelling.	The scope of the No-Significant Effects Report considered the advice provided by Natural England. The report is provided in Appendix 9.9.1.

9.4. Assessment Methodology

Relevant Guidance

9.4.1 The following guidance has been used to inform the assessment of likely effects, where relevant:

- British Standards Institution (2013) Biodiversity – Code of Practice for Planning and Development: BS 42020:2013;
- Chartered Institute of Ecology and Environmental Management (2019) Guidelines for Ecological Impact Assessment in the United Kingdom;
- Ministry of Housing, Communities and Local Government (2019b) Planning Practice Guidance: Natural Environment – Biodiversity, Ecosystems and Green Infrastructure;
- Institute of Environmental Assessment (1995) Guidelines for Baseline Ecological Assessment; and
- Civil Aviation Authority (CAA) (2017) Wildlife Hazard Management at Aerodromes.

9.4.2 Guidance relevant to other specific species groups has also been considered and is set out in the relevant sections of this chapter.

Scope of the Assessment

9.4.3 The scope of this PEIR has been developed in consultation with relevant statutory and non-statutory consultees as detailed in Table 9.3.1 and Table 9.3.2.

9.4.4 Taking into account the scoping and consultation process, Table 9.4.1 summarises the issues considered as part of this assessment.

Table 9.4.1: Issues Considered within the Assessment

Activity	Potential Effects
Construction Phase (including Demolition)	
Construction and	Effects on designated sites and habitats as a result of construction activity including habitat severance and loss of ecological connectivity, habitat disturbance (eg light, noise pollution/ introduction of toxic pollutants), changes to water quality/flow and changes in air quality

Activity	Potential Effects
demolition activities	(emissions from traffic and dust). Effects on species valued as important features of designated sites.
	Effects on habitats (set out above) as a result of construction activity eg habitat loss, habitat severance and loss of ecological connectivity, habitat disturbance (eg dust, light, noise pollution/introduction of toxic pollutants), through changes to air and water quality/flow.
	Effects on species as a result of construction activity within airport boundary (eg direct killing or injuring of fauna, disturbance and displacement of species (particularly to those sensitive to noise and light disturbance), introduction or spread of invasive species, changes to water quality).
Construction of highways improvements	Effects on habitats as a result of construction of upgraded highway junctions (eg habitat loss, habitat severance and loss of ecological connectivity, habitat disturbance (eg dust, light, noise pollution/introduction of toxic pollutants), changes to air and water quality/flow).
	Effects on species as a result of construction of upgraded highway junctions (eg direct killing/injury through activity/pollution, disturbance by increased noise/light, loss of foraging/commuting habitat).
Use of construction compounds and creation of mitigation areas	Effects on habitats, including ancient woodland, as a result of use of construction compounds and creation of mitigation areas beyond the airport boundary (eg habitat loss, habitat severance and loss of ecological connectivity, habitat disturbance (eg dust, light, noise pollution/ introduction of toxic pollutants), introduction or spread of invasive species (in particular along the water courses within the airport and surrounding land), changes to air/water quality/flow).
	Effects on species as a result of use of construction compounds and creation of mitigation areas beyond the airport boundary (eg direct killing or injuring of fauna, disturbance and displacement of species (particularly to those sensitive to noise and light disturbance), introduction or spread of invasive species)
Operational Phase	
Use of airport, including upgraded highway junctions	Effects on designated sites (set out above) as a result of changes to air quality both from airport operations and traffic emissions.
	Effects on habitats as a result of operational activity, including light and noise, as well as from changes to air quality both from airport operations and traffic emissions (air traffic movements and surface access) (eg habitat loss, habitat severance and loss of ecological connectivity, habitat disturbance (eg dust, light, noise pollution/introduction of toxic pollutants)).
	Effects on species as a result of operational activity (including light and noise) (eg direct killing or injuring of fauna (including bird/bat strike from increased air traffic movements and road traffic collisions), disturbance and displacement of species (particularly to those sensitive to noise and light disturbance), introduction or spread of invasive species).

9.4.5 Effects which are not considered likely to be significant have been scoped out of the assessment. A summary of the effects scoped out are presented in Table 9.4.2.

Table 9.4.2: Issues Scoped Out of the Assessment

Issue	Justification
Effects on designated sites arising from direct habitat loss.	No habitat loss would occur within any of the identified designated sites, at European, national or local level. Therefore, no impact pathway would exist.

Study Area and Zone of Influence

9.4.6 For the majority of surveys, the study area was the Project site boundary. However, surveys for more mobile and sensitive species such as bats, birds and otters have been extended beyond the Project site boundary.

9.4.7 The study area for the desk study for this assessment included a 20 km buffer for European designated sites and 5 km buffer for nationally and locally designated sites. A 10 km buffer was used to gather records for bats and otter. Records of other protected and notable species were gathered from within a 2 km buffer.

Designated Sites

9.4.8 The initial search area for European designated sites (including SACs, SPAs and Ramsar sites) was 20 km from the Project site boundary to allow for effects arising from vehicle emissions. This buffer was extended for SACs designated for bats within 30 km of the Project site.

9.4.9 An initial buffer of 5 km for other sites (SSSIs, National Nature Reserves (NNRs), Local Nature Reserves (LNRs) and locally-designated sites) was used for the data search to allow for effects arising from works at the Project site and effects arising from changes to surface access arrangements. An initial 5 km buffer is considered appropriate since this recognises that effects due to surface access arrangements may occur at some distance from the Project site.

Protected and Notable Species

9.4.10 Records of protected or otherwise notable species were requested from the local records centres within a 2 km radius of the Project site boundary, except for otters and bats where a larger 10 km radius was used.

9.4.11 The survey area for the majority of surveys was within the Project site boundary. However, it is recognised that effects on ecological receptors can occur beyond such limits, especially for mobile species such as bats and birds. Barriers to dispersal have been considered in survey designs, for example where great crested newt (GCN) ponds have been discounted due to them being separated from the Project site by major roads. Additional surveys are planned to further assess any potential effects where land access was not available or due to the knowledge gained during the earlier surveys and as the Project design has evolved.

9.4.12 The survey area has included the major watercourses that flow through the Project site to identify any potential sign of otters/water voles. For the ES, this is proposed to be extended to include up to 500 metres both upstream and downstream of the watercourses, where access permits.

Zone of Influence

9.4.13 The study areas for both designated sites and species have been used to determine the ZoI for the assessment of effects. This means that the ZoI has also adapted and responded as survey/modelling data are collected.

Methodology for Baseline Studies

Desk Study

9.4.14 Information on ecology and nature conservation within the desk study search area was collected through a data gathering exercise in 2019 to obtain information relating to statutory and non-statutory nature conservation sites, priority habitats and species, and legally protected and controlled species. A review of existing studies and datasets was also undertaken. The desk-based work will be updated as necessary throughout the EIA process.

9.4.15 Details of the organisations and individuals contacted to obtain ecological data are provided in Appendix 9.6.1: Ecological Desk Study, and comprised:

- Sussex Biodiversity Record Centre;
- East Surrey Badger Protection Society;
- West Surrey Badger Group;
- Badger Trust-Sussex;
- Surrey Biodiversity Information Centre; and
- R. Bicker, Gatwick Airport Biodiversity Consultant (Bicker, 2018).

9.4.16 The desk study data will be updated further prior to ES submission to check for any new records arising since the desk study was undertaken.

Site-Specific Surveys

9.4.17 The scope and methodology of surveys undertaken for the Project were determined following an assessment of site conditions. The following site-specific surveys were conducted and are described below:

- phase 1 habitat survey;
- hedgerow survey;
- badger survey;
- bat activity, emergence and trapping surveys;
- breeding bird survey;
- wintering bird survey;
- dormouse survey;
- great crested newt survey;
- reptile survey;
- water vole and otter survey;
- national vegetation classification survey;
- fish survey; and
- invertebrate habitat appraisal.

9.4.18 A summary of the methodologies used is provided below, with full details and plans showing survey areas provided in Appendix 9.6.2: Ecology Survey Report and confidential Appendix 9.6.4 Badger Survey Report.

Phase 1 Habitat Survey

9.4.19 The methodology and habitat descriptions used were based on the standard Joint Nature Conservation Committee (JNCC) Phase 1 habitat survey methodology 'Handbook for Phase 1 Habitat Survey' (JNCC, 2010).

9.4.20 The Phase 1 habitat survey was carried out on 18 to 22 March and on 10 and 11 July 2019. The Phase 1 survey covered the Project site boundary.

9.4.21 Habitats identified during the survey were described using the categories set out in the Phase 1 Survey handbook (JNCC, 2010).

9.4.22 Together with the desk study, the Phase 1 habitat survey identified the further Phase 2 surveys needed for protected and otherwise notable species. These are described below.

Hedgerow Survey

9.4.23 A hedgerow survey was undertaken to establish which hedgerows (if any) would qualify as 'Important' under the Hedgerow Regulations 1997.

9.4.24 The surveys were undertaken on 5 - 8 August 2019. The surveys took into account guidance provided in the Hedgerow Survey Handbook (Department for Environment, Food and Rural Affairs (Defra), 2007) and the Hedgerow Regulations 1997. For the purposes of this survey, only hedgerows over 30 years old were included, as defined in the Hedgerow Regulations (1997) Section 4a.

9.4.25 The survey included all species-rich hedgerows within the Project site boundary.

Badger Survey

9.4.26 A badger survey was carried out during on 5 – 9 August 2019. The survey covered the Project site boundary area and was based on standard survey practice for badgers and sought to identify and record all signs of badger activity. Any incidental signs of badger activity were also noted during the course of other survey work undertaken on site.

Bat Surveys

9.4.27 A range of bat surveys were undertaken based on methods proposed in the document 'Bat Surveys - Good Practice Guidelines' (Bat Conservation Trust, 2016).

9.4.28 Twice monthly bat activity surveys were undertaken between April and September 2019. A total of six transect routes were surveyed which covered the areas of suitable habitat for foraging and commuting bats on the site.

9.4.29 In addition to the transect surveys, static automated surveys of bat activity at key points were conducted between April and October 2019. These surveys used bat detectors placed in particular locations to monitor bat activity continuously over a period of several days. These surveys were undertaken in locations which were likely to be used by the rarer species, particularly Bechstein's bats.

9.4.30 Further data on bat activity for land not surveyed during the 2019 surveys were gathered during August to October 2020. These surveys are ongoing (during 2021) and the findings will be reported in the ES.

9.4.31 With respect to roosting bats, a walkover survey was conducted between 18 – 22 March 2019 to identify buildings with potential to support bat roosts. Two buildings were identified within the Project site boundary and in July, August, September and October 2019 evening emergence and dawn re-entry surveys were undertaken to identify whether bats were emerging from or returning to them.

Bat Trapping

9.4.32 Trapping surveys were undertaken during three periods which corresponded with key stages of the annual life cycle of bats. The surveys were undertaken between 28-30 May 2019 (maternity), 15-17 July 2019 (post-maternity) and 2-4 September 2019 (autumnal dispersal). Additional surveys were completed in July 2020 and September 2020.

9.4.33 Trapping focused more intensively on parts of the Project site that may be of importance to bats, such as locations of known roosts and areas of high suitability foraging/commuting habitat. The full details of the trapping locations are shown in Appendix 9.6.3.

Radio-tracking

9.4.34 Bats were selected for radio-tagging on the basis of their species and apparent health and body condition. Female bats, and in particular reproductive females (avoiding heavily pregnant bats), were radio-tagged in preference to male bats to enable identification of the location of breeding colonies.

9.4.35 Species selected for radio-tagging focused on the woodland assemblage of bats and/or rarer species and included alcathoe bat, barbastelle, Bechstein's bat, Brandt's bat, brown long-eared bat, Daubenton's bat, grey long-eared bat, Nathusius' pipistrelle, Natterer's bat and whiskered bat.

9.4.36 Each bat fitted with a radio-tag was followed for a minimum of three nights and a maximum of seven nights, depending on the results obtained from the estimates of home range analysis.

Wintering Bird Surveys

9.4.37 Wintering bird surveys were undertaken within the Project site boundary. The wintering bird surveys were based on a transect survey methodology as detailed in Bibby *et al.* (2000) and Gilbert *et al.* (1998). Surveys for wintering birds were undertaken between October 2018 and March 2019. A total of five survey visits were undertaken, each over two consecutive days.

Breeding Bird Surveys

9.4.38 Breeding bird surveys were undertaken within the Project site boundary. These surveys were carried out in accordance with a standard territory mapping methodology as outlined in Gilbert *et al*. (1998) and Bibby *et al.* (2000). Visits were undertaken on 27 & 28 March, 9, 10, 23 & 24 April, 7, 8, 21 & 22 May and 5, 6 & 27 June 2019.

Dormouse Surveys

9.4.39 Dormouse surveys were undertaken based on the methodology and best practice guidelines and recommendations described in the Dormouse Conservation Handbook (Bright *et al.,* 2006).

9.4.40 Dormouse nest tubes were installed on 1 - 4 April, 9 - 11 April and 29 May 2019 within woodland and hedgerows within the Project site boundary. Each tube was checked monthly, between May and October 2019.

Great Crested Newt Survey

9.4.41 Waterbodies within the Project site boundary were identified during a desk based study using Ordnance Survey mapping and aerial photography and during the Phase 1 habitat survey.

9.4.42 A Habitat Suitability Index (HSI) assessment was subsequently undertaken to determine the value of ponds as breeding sites for GCN.

9.4.43 GCN presence/absence surveys were carried out using a combination of traditional methods (bottle trapping, torching and egg searches) and using the environmental DNA (eDNA) technique. The surveys were undertaken on ponds within 250 metres of the Project site boundary which had an HSI score of 'Average' or above, and which were accessible.

9.4.44 The eDNA surveys were undertaken on 17 April 2019, which falls within the optimum period for this type of survey and followed the eDNA surveying and laboratory analysis guidance (Biggs *et al*., 2014).

9.4.45 Population class size surveys were undertaken on ponds found to support GCN from the presence/absence surveys. The presence/absence and population class size surveys were undertaken between April and June 2019 following the guidance provided in the Great Crested Newt Mitigation Guidelines (English Nature, 2001).

Reptile Surveys

9.4.46 A reptile survey was undertaken between April and early October 2019. This survey was undertaken for areas identified during the Phase 1 habitat survey as providing potentially suitable reptile habitat.

9.4.47 The survey was undertaken having regard to the methodology described in the Froglife Advice Sheet 10: Reptile Survey (Froglife, 1999) and the JNCC Herpetofauna Workers' Manual (Gent and Gibson, 2003).

9.4.48 The recommended survey methodology contained in the Design Manual for Roads and Bridges (Highways England *et al.*, 2020a) includes a combination of direct observation and artificial refugia based surveys. Artificial refugia were laid out in suitable locations.

9.4.49 Findings from the survey were used to estimate population sizes for the reptile species recorded at each site, by employing the method suggested in Froglife (1999).

Water Vole and Otter Survey

9.4.50 Otter and water vole surveys were undertaken on 13 and 14 May 2019. Watercourses within the Project site boundary were surveyed for signs that could indicate the presence of either otters or water voles.

9.4.51 The otter survey was undertaken with regard to the methodology described in the Design Manual for Roads and Bridges, LD118 (Highways England *et al*., 2020a). The methodology was developed for linear schemes which may affect otter habitats or populations.

9.4.52 The water vole survey was based on the survey methodology described in Water Vole Conservation Handbook (Strachan, Moorhouse and Gelling, 2011).

Invertebrate Habitat Appraisal

9.4.53 An invertebrate habitat appraisal was undertaken in June 2019. This survey identified potential areas of interest for terrestrial and aquatic invertebrates by an invertebrate specialist. The appraisal identified the areas where future, more detailed terrestrial and aquatic invertebrate surveys would be required and their scope.

Terrestrial Invertebrate Survey

9.4.54 Walk-over surveys for terrestrial invertebrates were completed on six occasions during 2020 – 27 May, 19 June, 22 June, 30 June, 10 September and 14 September 2020. These focused on areas along the River Mole and the Gatwick Stream. On each occasion, the areas were walked by an experienced entomologist who sampled along each transect using sweep netting, a beating tray and stout trowel.

9.4.55 The survey concentrated on the following major groups (orders): Coleoptera (beetles), Diptera (flies), Hemiptera (bugs, froghoppers, etc), Hymenoptera (bees, wasps and ants) and Lepidoptera (butterflies and moths). Some examples of other groups were noted if found.

9.4.56 Samples were collected for later laboratory identification.

Aquatic Macroinvertebrate Survey

9.4.57 Following an initial scoping walk-over, 100 m sections of both the River Mole and Gatwick Stream were identified for detailed survey as representative of the site. Three survey visits were undertaken during 2020; 4 June, 29 July and 29 September. Samples were collected at each of the sites using the Whalley Hawkes Paisley Trigg (WHPT) method comprising a standard three-minute kick sample using a long-handled pond net with 1 mm mesh size, which was supplemented by a one-minute hand search.

Fish Survey

9.4.58 Fish surveys were undertaken using the catch depletion method in order to assess species composition, age structure and to estimate population size. Surveys were undertaken by an accredited electric fishing team comprising three members of staff. Surveys and analysis conformed to the relevant guidance outlined in BS EN 14011:2003 Water Quality: Sampling of Fish with Electricity (British Standards Institute, 2003).

9.4.59 Surveys were undertaken in spring (04 June) and autumn (29 September) 2020 along the same 100 m stretches used for the aquatic invertebrate surveys.

Botanical Survey and National Vegetation Classification Survey

9.4.60 A national vegetation classification (NVC) survey (JNCC, 2006) was undertaken in April, July and August 2019 to investigate habitats of raised conservation interest. The potential areas of interest were identified from the Phase 1 habitat mapping and were visited by a botanist.

9.4.61 The botanist also undertook a search for protected and notable flora and invasive plant species within the Project site boundary.

Survey Limitations

9.4.62 All seasonally dependent surveys were undertaken at optimal times of the year and under suitable weather conditions. Therefore, survey timing did not represent a survey limitation for the assessment.

9.4.63 It was not possible to obtain access to survey every area identified as having the potential to support protected species (particularly areas located outside of the Project site boundary). This is a particular limitation with respect to potential effects on great crested newts and bats.

9.4.64 It should also be noted that all surveys have inherent limitations in their design and are indicative of what is happening at a particular point in time, however, appropriate assumptions based on the information available have been made for the purposes of assessment.

9.4.65 Full details of survey limitations are provided in Appendices 9.6.2 and 9.6.3.

Assessment Criteria and Assignment of Significance

9.4.66 The significance of an effect is determined based on the sensitivity of a receptor and the magnitude of an impact. This section describes the criteria applied in this chapter to characterise the sensitivity of receptors and magnitude of potential impacts. The terms used to define magnitude and sensitivity are based on and have been adapted from those used in the Design Manual for Roads and Bridges (DMRB) methodology (Highways England *et al*., 2020b), which is described in further detail in Chapter 6: Approach to Environmental Assessment.

Receptor Sensitivity/Value

9.4.67 Several factors have been taken into consideration when assessing the value of an ecological feature and whether it is considered important and therefore requires assessment.

9.4.68 In assessing the value of habitats or species populations, a subjective assessment has been made, based on a range of factors that influence overall ecological value. Amongst other factors, a series of criteria have been considered for habitats and populations of species including: fragility, rarity, extent, diversity, position in the landscape, naturalness, and recorded history.

9.4.69 Other resources that have been used to inform the assessment of value and importance include, but are not limited to:

- UK legislation;
- Habitats and Species of Principal Importance (Section 41 of the NERC Act, 2006);
- Birds of Conservation Concern (BoCC) Red and Amber lists; and
- National and County Red Data Book species.

9.4.70 The resources used to assess the value and importance of features also help to define the importance in the context of geographical scale. The CIEEM guidelines (CIEEM, 2019) state that significance of effects on ecological features should be qualified with reference to the appropriate geographic scale. Therefore, to provide a framework that is consistent for both assessing the importance of ecological features and determining the significance of effects, the importance of ecological features has been described using the following geographic scales:

- international;
- national;

- regional (south east England);
- county;
- local; and
- site and immediate surroundings.

9.4.71 Table 9.4.3 below indicates how the value of receptors has been described within this assessment.

Table 9.4.3: Sensitivity Criteria

Sensitivity	Definition
Very High (International)	An internationally designated site or candidate site, such as a Special Protection Area (SPA), Special Area of Conservation (SAC), Ramsar Site, Biosphere Reserve or an area Natural England has determined meets the published selection criteria for such a designation, irrespective of whether or not it has yet been notified.
High (National)	A nationally designated site, eg SSSI, National Nature Reserves (NNR), Marine Nature Reserves or an area which Natural England has determined meets the published selection criteria for national designation (eg SSSI selection guidelines irrespective of whether or not it has yet been notified.
Medium (Regional/County)	Viable areas of habitat identified in a County Biodiversity Action Plan (BAP) or designated as a Local Wildlife Site (LWS), a local significant population of a species identified as important on a county basis, such as a County BAP.
Low (Local)	Diverse and/or ecologically valuable habitats not of County importance.
Site	Features of value to the immediate area only.
Negligible	Commonplace feature of little or no habitat/historical significance. Loss of such a feature would not be seen as detrimental to the ecology of the area.

Magnitude of Impact

9.4.72 Impacts may be described in terms of changes to the structure or function of an ecological resource and are characterised according to a number of parameters where these are relevant. These parameters include:

- beneficial or adverse – impacts may be either, depending on the nature of the impact;
- extent - the geographical range over which the impact occurs;
- magnitude – the size of the impact in terms of amount of a feature affected;
- duration and timing – when the impact would occur and how long it would last;
- frequency – whether the impact would be a single event or multiple events; and
- reversibility – the impact may be permanent, or may naturally reverse without mitigation, or may be reversible with appropriate mitigation.

9.4.73 Table 9.4.4 below indicates how the magnitude of impacts has been described within this assessment.

Table 9.4.4: Impact Magnitude Criteria

Magnitude of Impact	Definition
High	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements (Adverse).
	Large scale or major improvement of resource quality; extensive restoration or enhancement; major improvement of attribute quality (Beneficial).
Medium	Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements (Adverse).
	Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality (Beneficial).
Low	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements (Adverse).
	Minor benefit to, or addition of, one (maybe more) key characteristic, feature or element; some beneficial impact on attribute or a reduced risk of negative impact occurring (Beneficial).
Negligible	Very minor loss or detrimental alteration to one or more characteristics, features or elements (Adverse).
	Very minor benefit to or positive addition of one or more characteristics, features or elements (Beneficial).
No Change	No loss or alteration of characteristics, features or elements; no observable impact in either direction.

Significance of Effect

9.4.74 The significance of an effect has been determined by taking into account the sensitivity of the receptor and the magnitude of the impact. The method employed for this assessment is presented in Table 9.4.5. Where a range of significance levels are presented, the final assessment for each effect is based upon professional judgement.

9.4.75 In all cases, the evaluation of receptor sensitivity, impact magnitude and significance of effect has been informed by professional judgement and is underpinned by narrative to explain the conclusions reached.

9.4.76 For the purpose of this assessment, any effects with a significance level of minor or less are not considered to be significant in terms of the EIA Regulations.

Table 9.4.5: Assessment Matrix

Sensitivity	Magnitude of Impact				
	No Change	Negligible	Low	Medium	High
Negligible	No change	Negligible	Negligible or Minor	Negligible or Minor	Minor
Low	No change	Negligible or Minor	Negligible or Minor	Minor	Minor or Moderate
Medium	No change	Negligible or Minor	Minor	Moderate	Moderate or Major
High	No change	Minor	Minor or Moderate	Moderate or Major	Major or Substantial
Very High	No change	Minor	Moderate or Major	Major or Substantial	Substantial

9.4.77 A description of the significance levels is as follows.

- Substantial: Only adverse effects are normally assigned this level of significance. These effects are generally, but not exclusively, associated with sites or features of international importance that are likely to suffer a most damaging impact and loss of resource integrity. However, a major change in a site or feature of national importance may also enter this category.
- Major: These beneficial or adverse effects are generally, but not exclusively, associated with sites or features of international or national importance that are likely to suffer a most damaging impact and loss of resource integrity. However, a major change in a site or feature of regional importance may also enter this category.
- Moderate: These may be beneficial or adverse effects, arising from a high level of impact on a less sensitive site or a lower magnitude of impact on a more sensitive site. The cumulative effects of such factors may lead to an increase in the overall effect on a particular resource or receptor.
- Minor: These beneficial or adverse effects are often localised but may be important in enhancing the subsequent design of the Project.
- Negligible: No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

9.5. Assumptions and Limitations of the Assessment

9.5.1 A request for data to inform the ecological desk study was sent to Surrey Biodiversity Records Centre but by the date of drafting this chapter (summer 2021) no data had been received. Therefore, this assessment relies on data provided during a previous desk study undertaken in 2016. It is considered unlikely that the distribution of non-statutory designated sites and protected and notable species records would have changed significantly but new data may be available. As such, all desk-based work, including requests for current data from local records centres etc., will be confirmed and updated if required for the ES.

9.5.2 There have also been minor limitations in data collection during protected species surveys due to land access restrictions and issues with data collection relating to equipment and its operation. This has resulted in some survey visits being undertaken during less optimal periods or data not

being collected. However, this accounts for a small proportion of the total data collected and is either sufficiently covered by the data available or would be remedied during the EIA process for inclusion in the ES. Full details of survey limitations are included in Appendix 9.6.2: Ecology Survey Report.

9.5.3 No assumptions or limitations have been identified in the preparation of this chapter that would prevent a preliminary assessment of the potential effects being made.

9.6. Baseline Environment Conditions

9.6.1 An ecological desk study, Phase 1 habitat survey and a number of terrestrial and aquatic surveys were undertaken during the period 2019 to 2021 to establish ecological baseline conditions and are summarised in this part of the chapter. The full results are provided in Appendix 9.6.2: Ecology Survey Report.

Statutory and Non-statutory Designated Sites

9.6.2 There are 17 statutory designated sites located within the search area. Their locations are shown on Figure 9.6.1. These include three internationally designated sites within 20 km of the Project site boundary which are listed below:

- Mole Gap to Reigate Escarpment SAC: located 9.2 km to the north west of the Project site boundary;
- Ashdown Forest SAC: located 12 km to the south west of the Project site boundary; and
- Ashdown Forest SPA: located 12 km to the south west of the Project site boundary.

9.6.3 In addition, following consultation with Natural England, the following European sites designated for their bat populations beyond 20 km from the Project site boundary have been identified for consideration:

- Ebernoe Common SAC located 29 km to the south west of the site; and
- The Mens SAC located 25 km to the south west of the site.

9.6.4 In addition, following further consultation with Natural England with respect to the potential impacts of changes in air quality from vehicle emissions on major roads, the following sites have also been included:

- Thames Basin Heaths SPA located 23.6 km to the north west of the site; and
- Thursley, Ash, Pirbright and Chobham SAC located 33.8 km to the north west of the site

9.6.5 The remaining 14 nationally designated sites within 5 km of the Project site boundary are:

- Willoughby Fields Local Nature Reserve (LNR): located 786 metres to the south of the site;
- Grattons Park LNR: located 1.25 km to the south of the site;
- Edolph's Copse LNR: located 1.54 km to the west of the site;
- Glover's Wood SSSI: located 1.62 km to the west of the site;
- Waterlea Meadow LNR: located 3.49 km to the south of the site;
- Worth Way Country Park (CP): located 3.7 km to the south east of the site;
- Tilgate Forest LNR located 4.19 km to the south of the site;
- House Copse SSSI: located 4.34 km to the south west of the site;
- Hedgecourt SSSI: located 4.62 km to the east of the site;

- Buchan Hill Ponds SSSI: located 4.93 km to the south of the site;
- Tilgate Park CP: located 4.9 km to the south of the site;
- Target Hill Park: LNR located 4.9 km to the south of the site;
- Buchan CP: located 4.9 km to the south of the site; and
- Broadfield Park LNR: located 5.06 km to the south of the site.

9.6.6 There are no statutory designated sites within the Project site boundary, with the nearest being Willoughby Fields Local Nature Reserve (LNR), located approximately 786 metres to the south of the site.

9.6.7 A total of 21 non-statutory designated sites were identified within 5 km of the Project site boundary through the 2019 desk study. A further 12 were identified within Surrey from the 2016 desk study. Horleyland Wood Local Wildlife Site (LWS), comprised of woodland, is located within the Project site boundary. A list of all 21 sites and their distance to the Project site boundary is provided in Table 9.6.1 below and shown on Figure 9.6.2.

Table 9.6.1: Non-Statutory Sites within 5 km of the Project Site

Site Name	Type	Distance from Site (m)
Horleyland Wood	LWS	Within Project site boundary
Rowley Wood	LWS	691
Willoughby Fields	LWS	752
Grattons Pond	LWS	1,224
Wood near Lower Prestwood Farm	LWS	1,298
A264 Copthorne	DRV	1,643
Ifield Brook Wood and Meadows	LWS	1,671
Copthorne Common	LWS	2,157
Ewhurst Wood	LWS	2,170
Orltons Copse	LWS	2,216
Worth Way	LWS	3,726
Ifield Pond and surroundings	LWS	3,130
The Hawth	LWS	3,432
Worth Meadows	LWS	3,517
Hyde Hill	LWS	3,533
Oaken Wood, Stony Plats & High Lines	LWS	3,591
Woldhurstlea Wood	LWS	3,717
Tilgate Park	LWS	4,899
Lobbs Wood & Furnace Pond	LWS	4,690
Kilnwood Copse	LWS	4,924
Buchan Country Park	LWS	4,923
The Roughs	*SNCI*	*82*
Withy Gill	*SNCI*	*172*
Dukes copse	*SNCI*	*4,370*
Leg of Mutton Wood, The Jordans and Jordans Wood	*SNCI*	*3,363*
Brook Wood	*SNCI*	*1,791*

Site Name	Type	Distance from Site (m)
Bridgeham Wood	*SNCI*	*1,030*
Acorn Wood, Cidermill and The Birches	*SNCI*	*3,210*
Wheatfield Marsh	*SNCI*	*1,671*
Copper Coin Pond	*SNCI*	*1,422*
Copper Coin Paddocks	*SNCI*	*1,399*
Charlwood Stanhill Court Meadow	*SNCI*	*2,054*
Langshott Wood	*SNCI*	*1,722*

Abbreviations used in Table 9.6.1: LWS: Local Wildlife Site; DRV: Designated Road Verge; SNCI: Site of Nature Conservation Interest. Records in italic were provided by Surrey Biodiversity Information Centre in 2016 and so may not be current.

9.6.8 Gatwick Woods Biodiversity Opportunity Area (BOA) is located partially within the Project boundary to the east of the airport. Details of further BOAs within the study area have been requested but not received. They will be included in the ES, if available.

Habitats

9.6.9 The findings of the Phase 1 habitat survey are summarised below and set out in more detail in Appendix 9.6.2: Ecology Survey Report, including a detailed Phase 1 habitat plan. Figure 9.6.3 identifies the key habitat types present. Where key areas have been given a target note (TN), these have been referenced within the text below. A full list of target notes can be found within Appendix 9.6.2, Annex 3, Table A3.4.

9.6.10 At the time of survey, the majority of the Project site comprised habitats associated with the airport including amenity grassland, areas of tarmacked hard standing and an array of buildings associated with the wider airport.

9.6.11 Areas around the periphery of the airport were identified as more natural and included areas of broadleaved woodland and neutral grasslands.

9.6.12 The Project site includes two areas managed by GAL as part of their Biodiversity Action Plan (BAP). These are described below.

- The North West Zone (NWZ) made up of the river corridor of the River Mole comprising the stream, neutral grasslands and broadleaved woodland.
- The Land East of the Railway Line (LERL) made up of broadleaved woodland, neutral grassland (including a flood storage area) and the Gatwick Stream.

9.6.13 The locations of the BAP areas and other areas around the periphery of the Project site are shown on Figure 4.2.1c along with the names used to describe them within this chapter.

Semi-natural Broadleaved Woodland

9.6.14 Habitats within the Project site boundary include semi-natural broadleaved woodland located mainly within the LERL site, along the western side of the River Mole corridor (NWZ), Brockley Wood (TN7), Crawter's Wood (TN13), and the southern boundary.

9.6.15 Brockley Wood and Horleyland Wood (TN3) are both designated as ancient woodland. A portion of Lower Picketts Wood (TN4) and woodland along the north west side of the River Mole are also ancient woodland.

Broadleaved Plantation Woodland

9.6.16 Broadleaved plantation woodland is associated with highway planting along the embankments of the M23 spur road, around the south west corner of Pentagon Field, new planting within the LERL biodiversity area (TN6 a,b,c) and along the western edge of London Road.

Mixed Plantation Woodland

9.6.17 Within the northern part of the airfield, a large bank has been planted with a mix of broadleaved and coniferous trees.

Dense/Continuous Scrub

9.6.18 Dense and continuous scrub is present along the M23 spur road embankments, along the southern boundary of the LERL biodiversity area, and in a large area on the western flank of Brockley Wood.

Scattered Scrub

9.6.19 Scattered scrub was identified within the south west corner of Museum Field, scattered through the marshy grassland and around the base of the large earth bank south west of Brockley Wood (TN8).

Scattered Broadleaved Trees

9.6.20 Scattered broadleaved trees are present throughout the Project site, especially within the car parks (Long Stay South, Long Stay North, Car Park X), within Pentagon Field (TN1), the LERL biodiversity area and around Museum Field where they include individual trees and trees planted in groups or lines. Along existing roadsides, individual trees forming lines of trees comprising both mature and semi-mature trees were identified.

Mixed Scattered Trees

9.6.21 Within Longbridge roundabout, a mix of semi-mature broadleaved and coniferous trees have been planted. Tree species include oak, silver birch and leylandii.

9.6.22 Around the north west corner of the roundabout, south east of Holiday Inn, coniferous trees line the eastern side of the amenity grassland, west of the pavement. A single example of a leylandii, a sycamore and a cherry were present within the line of conifers.

Neutral Semi-improved Grassland

9.6.23 The main areas of neutral semi-improved grassland were identified in the south of the Project site within the fields south of Upper Picketts Wood, in the east within Pentagon Field and south of the M23 spur road, along the River Mole corridor (NWZ) and to the east of the Fire Training Ground.

Improved Grassland

9.6.24 The grassland areas around Museum Field were identified as being heavily managed improved grassland fields. The field north of the M23 spur-Airport Way roundabout and the fields south of the M23 spur were also noted as being managed improved grassland paddocks.

Marshy Grassland

9.6.25 Marshy grassland was recorded in the south east of the site within the LERL south of Crawley Sewage Treatment Works, south west of Museum Field, in the two fields south of Brockley Wood and south west of the new Boeing hangar and in areas along the River Mole corridor (NWZ) (TN10 a, b and c).

Poor Semi-improved Grassland

9.6.26 Around Pond E, the grassland is less managed but did not have a diverse species range. Along the north western border of the Pentagon Field there is a strip of poor-semi improved grassland.

Tall Ruderal

9.6.27 A large area of tall ruderal vegetation is located to the east of the Gatwick Stream, south of the Crawley Sewage Treatment Works.

Marginal Vegetation

9.6.28 Marginal vegetation was identified along the banks of the River Mole.

Swamp

9.6.29 The area immediately surrounding Pond E11 is dominated by bulrushes creating a swamp habitat.

Standing Water

9.6.30 At the time of survey, standing water was evident as a number of ponds, lagoons and ditches. These habitats are located within all areas of the Project site boundary.

Running Water

9.6.31 The River Mole, Crawters Brook and Gatwick Stream are the largest linear sections of running water through the Project site boundary.

Amenity Grassland

9.6.32 Managed and mown amenity grassland is located around the runways and taxiways, the new and old lagoons and various ponds (as described within Appendix 9.6.2, Annex 3, Table A3.1), and around the roundabouts and roadside verges.

Introduced Shrub

9.6.33 Planted beds of introduced shrub are present throughout the car parks and at the entrances to the airport.

Species-rich Hedgerow

9.6.34 A species-rich hedge was identified along the western boundary of the Museum Field. Further species-rich hedgerows are located around the Pentagon Field.

Species-poor Hedgerow

9.6.35 The majority of hedgerows around Museum Field are species-poor hedgerows.

Species-poor Hedgerow with Trees

9.6.36 A species-poor hedge with trees was located along a footpath, north of the M23 spur road.

Fences

9.6.37 Large security fences surround the whole of the airport. Metal security fencing is also present around Crawley Sewage Treatment Works and all car parks. Wooden and wire and picket fencing was also identified through the woodland in the south east of the site.

Dry Ditches

9.6.38 Within the car parks in the north and south and through the fields south of the M23 spur road, a number of drainage ditches were identified, which were dry at the time of surveys.

Earth Banks

9.6.39 A number of earth banks are present, including a large one to the east of the River Mole and south of Brockley Wood (TN11). An earth noise bund is located along the western boundary of the airfield. Within the biodiversity fields, several low earth banks were identified. A large earth bank is present in the east of the south long stay car park.

Buildings

9.6.40 Apart from the buildings associated with the terminals, hangars and maintenance buildings within the airport, there was a variety of buildings with a mix of uses around the north, east and south of the airport.

Bare Ground

9.6.41 Bare ground was associated with the car park for the biodiversity areas south east of the London to Brighton railway (within the LERL).

Hardstanding

9.6.42 The majority of the areas of hardstanding comprise the operational airport's runways, aprons and taxiways, car parks in the northern part of the site and to the east of the railway and roads.

Species

9.6.43 The findings of the surveys that have been undertaken for protected and notable species are summarised below and reported in full in Appendix 9.6.2.

Plants

9.6.44 The WCA 1981 (as amended) lists protected plant species under Schedule 8. Two plant species listed on Schedule 8 were recorded within the Project site boundary: Bluebell *Hyacinthoides non-scripta* and pennyroyal *Mentha pulegium*.

9.6.45 The WCA 1981 (as amended) lists non-native invasive plant species under Schedule 9. One plant species listed on Schedule 9 was recorded within the Project site boundary: Himalayan balsam *Impatiens glandulifera.*

Wintering Birds

9.6.46 A total of 61 species were recorded within the survey boundary during the wintering bird survey between October 2018 and March 2019. Those of conservation interest are listed in Table 9.6.2 below.

Table 9.6.2: Conservation Status of Birds Recorded within Project Site (October 2018 - March 2019)

Species	Annex 1 EU Birds Directive	UK BAP Priority Species	NERC Species of Principal Importance	Birds of Conservation Concern
Bullfinch		•	•	Amber
Black-headed gull				Amber
Common gull				Amber
Dunnock		•	•	Amber
Fieldfare				Red
Green sandpiper				Amber
Greylag goose				Amber
Grey wagtail				Red
Herring gull		•	•	Amber
House sparrow		•	•	Red
Kestrel				Amber
Lapwing		•	•	Red
Lesser black-backed gull				Amber
Mallard				Amber
Marsh tit		•	•	Red
Mistle thrush				Red
Meadow pipit				Amber
Red kite	•			N/A
Redwing				Red
Skylark		•	•	Red
Snipe				Amber
Song thrush		•	•	Red
Starling		•	•	Red
Woodcock				Red

9.6.47 There were no wintering species recorded in any numbers which were considered to be of national or international significance. Of the 61 species recorded, the Project site was considered to be of site-level importance for lapwing, these were recorded predominantly around the Crawley Sewage Treatment Works.

9.6.48 The wintering bird population within the Project site is considered as being of no more than local importance.

Breeding Birds

9.6.49 The desk study search returned records for 45 species of notable and / or protected birds within 2 km of the Project site boundary.

9.6.50 The management techniques on land around Gatwick follow the guidance provided in CAP 772 Wildlife Hazard Management at Aerodromes (CAA, 2017) which may result in a lower baseline of recorded numbers of certain bird species and reduced counts of specific species during the breeding bird surveys than would be recorded if the management was not in place.

9.6.51 A total of 72 species were recorded during the survey of breeding birds within the Project site boundary and surrounding study area, of which 48 were confirmed to be breeding and three possibly breeding (peregrine, little ringed plover and firecrest), resulting in a breeding assemblage of 51 species.

9.6.52 All species of wild bird in the UK (other than a few pest species) are given general protection under Part 1 Section 1(1) of the WCA 1981 and birds listed under Schedule 1 of the Act are further protected.

9.6.53 Species listed on the Section 41 list of Species of Principal Importance of the NERC Act 2006, species included in BoCC Red and Amber Lists (Eaton *et al*., 2015) and species occurring in nationally, regionally or locally important numbers are also considered.

9.6.54 Of the 51 species recorded as breeding or possibly breeding within the survey area, 17 species meet at least one of the above criteria relating to special statutory protection or conservation importance and are listed in Table 9.6.3 below.

Table 9.6.3: Birds of Conservation Interest Confirmed as Breeding/Possibly Breeding within the Project Site and Surrounding Area

Species	Breeding status	No. of territories	Annex 1 EU Birds Directive	Schedule 1 WCA	NERC Species of Principal Importance	BoCC 4 Red and Amber species
Peregrine	Possible	1	■	■	-	-
Little ringed plover	Possible	1	-	■	-	-
Firecrest	Possible	1	-	■		-
Skylark	Confirmed	12	-	-	■	Red
Song thrush	Confirmed	19	-	-	■	Red
Marsh tit	Confirmed	1	-	-	■	Red
Starling	Confirmed	2	-	-	■	Red
House sparrow	Confirmed	4	-	-	■	Red
Linnet	Confirmed	1	-	-	■	Red
Grey wagtail	Confirmed	1	-	-	-	Red

Species	Breeding status	No. of territories	Annex 1 EU Birds Directive	Schedule 1 WCA	NERC Species of Principal Importance	BoCC 4 Red and Amber species
Mistle thrush	Confirmed	2	-	-	-	Red
Mallard	Confirmed	9	-	-	-	Amber
Kestrel	Confirmed	4	-	-	-	Amber
Stock dove	Confirmed	3	-	-	-	Amber
Dunnock	Confirmed	18	-	-	■	Amber
Bullfinch	Confirmed	1	-	-	■	Amber
Reed bunting	Confirmed	2	-	-	■	Amber

9.6.55 Three species (little ringed plover, peregrine and firecrest) were recorded within the Project site boundary and could possibly have bred. All three are listed under Schedule 1 of the WCA 1981.

9.6.56 Little ringed plover - one adult was recorded on visit five flying over the main lagoon east of Crawley Sewage Treatment Works in an area not accessible during the survey; it is possible birds may have been present on previous surveys and not detected.

9.6.57 Peregrine - one male was recorded on visit three on top of Pier 3, just north of the South Terminal building. As there was only one observation recorded, and due to access restrictions around airport buildings and high noise levels (which restricted the possibilities of detecting adults), it was not possible to confirm signs of breeding during the surveys.

9.6.58 Firecrest - single singing males were recorded at the eastern fringe of Horleyland Wood on visit two and in Upper Pickett's Wood on visit three. These observations could relate to territorial males that failed to find a mate or passage migrants as there were no further records beyond late April.

9.6.59 Nine species, confirmed as breeding within the survey area (skylark, dunnock, song thrush, marsh tit, starling, house sparrow, linnet, bullfinch and reed bunting) are listed in Section 41 of the NERC Act 2006 as being of principal importance for the conservation of biodiversity in England.

9.6.60 Eight species confirmed breeding within the survey area are included on the BoCC Red list (startling, marsh tit, skylark, song thrush, mistle thrush, house sparrow, grey wagtail and linnet).

9.6.61 Six species recorded during the survey are included on the BoCC Amber List (mallard, stock dove, kestrel, dunnock, bullfinch and reed bunting).

9.6.62 No breeding population of any species within the survey area approaches the 1% level of the national population. Therefore, no species considered to be breeding or possibly breeding are present in nationally important numbers.

9.6.63 The geographical importance of the breeding populations of species of conservation interest is local for all species except little ringed plover, marsh tit and firecrest, which are of county interest and peregrine, which is of regional interest. The diversity of species present within the survey area is at a level indicative of County importance for breeding birds.

Reptiles

9.6.64 The Project site offers a number of suitable habitats for reptiles, including wet and marshy areas, dense and scattered scrub, taller areas of grassland and earth banks.

9.6.65 Grass snakes were recorded within the Project site boundary in two distinct areas, along the River Mole corridor (NWZ) and within the grassland areas of the LERL. Juvenile grass snakes were recorded in both areas meaning that the two distinct populations are viable.

9.6.66 Grass snake is partially protected under Schedule 5 of the WCA 1981(as amended) and also listed under Section 41 of the NERC Act (2006).

9.6.67 No other reptiles were recorded during the 2019 reptile surveys.

Amphibians

9.6.68 A number of ponds and linear water features were identified during the Phase 1 habitat survey as being suitable to support all species of native amphibian.

9.6.69 A previous GCN survey (Wadsworth, 2016) in relation to the creation of the New Lagoon identified GCN as being present in Ponds; 8N8, W46 and 1WH.

9.6.70 GCN were recorded within four ponds within the Project site boundary. Two of the ponds were located in the woodland in the south east of the Project site. During the 2019 survey season one pond dried up, meaning not all surveys could be completed. No GCN were recorded whilst water was present in that pond.

9.6.71 The other two ponds were located west of the River Mole, within the grounds of the Bear and Bunny nursery.

9.6.72 Using the GCN Population Size Class assessment (Froglife, 2001) the maximum GCN count on one night using one survey method for each pond was zero, 13, eight and ten for the four ponds.

9.6.73 This equates to a medium GCN population size for one pond and small GCN population sizes for the remaining three ponds.

9.6.74 Although no GCN were recorded within one of the ponds, the eDNA survey result was positive and a single GCN egg was identified in the pond confirming that they were present, but likely to be in low numbers.

9.6.75 Smooth newts were recorded in nine ponds. Palmate Newt was recorded in four ponds. Small newts that could not be identified as either smooth newt or palmate newt were recorded within three ponds.

9.6.76 Common toad was recorded in one pond and along the northern edge of the field south of Brockley Wood.

9.6.77 Common frogs were recorded throughout the Project site. One edible frog was recorded within Pond TTD. These are not further considered within the assessment due to not being of conservation concern either because they are common and widespread in the UK or because they are a non-native species.

9.6.78 GCN is a European protected species and fully protected under Schedule 5 of the WCA 1981 (as amended). All other native amphibians are partially protected, under Schedule 5 of the WCA 1981 (as amended) prohibiting their sale. Common toad is also listed under Section 41 of the NERC Act (2006).

Badgers

9.6.79 Badgers and their setts are protected under the Protection of Badgers Act 1992.

9.6.80 Signs of badger activity were recorded during badger surveys. Due to the sensitive nature of badger data, the full findings of the surveys are reported in a confidential appendix (Appendix 9.6.4) which is available upon request to those with a legitimate need for the information.

Hazel Dormouse

9.6.81 The desk study provided records of dormice within the Project site boundary from 2016. However, in the 2019 surveys no dormice were identified along the River Mole corridor (NWZ), through Brockley Wood, Horleyland Wood, Upper Picketts Wood, Crawter's Wood or Riverside Garden Park.

9.6.82 Hazel dormouse is protected under Schedule 5 of the WCA Act 1981 (as amended).

9.6.83 After a season's survey, no dormice were recorded within the Project site boundary. Due to dormice living at such low densities, a further season of surveys will be undertaken to confirm absence pre commencement.

Otter

9.6.84 Signs of otters were not identified within the Project site boundary, during surveys. Otters are known to occur along watercourses within the wider area and due to their large territories, there is potential for them to utilise the habitats within the Project site boundary.

9.6.85 Otter is a European protected species and is protected under Schedule 5 of WCA 1981 (as amended).

Water Vole

9.6.86 No records of water voles were provided in the desk study and no signs of water vole were recorded within the Project site boundary.

9.6.87 Water voles are fully protected under Schedule 5 of the WCA 1981 (as amended).

Bats

9.6.88 The desk study provided records for at least fourteen bat species within and immediately adjacent to the Project site boundary, including records for Bechstein's bat, alcathoe bat and barbastelle bat.

Buildings

9.6.89 An assessment of the suitability of buildings for bat roosting potential, within the landside and airside areas of the Project site boundary, was undertaken at the time of the Phase 1 habitat survey.

9.6.90 Two buildings within the Project site boundary were identified as having suitable features present to support roosting bats: one, the Old Control Tower located in the north west of the Project site boundary (landside), adjacent to Control Tower Road and east of the River Mole; and the second, a disused ancillary building located along the southern boundary of the airside perimeter fencing, adjacent to Crawter's Brook and Staff Car Park Z.

9.6.91 A total of three emergence and/or dawn re-entry surveys were undertaken on each of the two buildings described above. No bats were recorded emerging from either building, and bat activity was generally very low across the site during the emergence surveys.

Activity Transects

9.6.92 Bat activity transects were also undertaken across the Project site between April and October 2019 and between August and October 2020.

9.6.93 A total of five transect routes were devised in 2019 to cover a broad range of habitat types present on site but focusing on those likely to be of greatest value to bats, including woodland, woodland edges, river corridors and open grassland. A further three routes were partially completed in 2020 covering areas of the site not surveyed previously. The remaining surveys will be completed in 2021.

9.6.94 At least six bat species were recorded across the survey area, including passes made by Leisler's bat, Nathusius' pipistrelle and *Myotis* bats. The *Myotis* bats could include rarer species.

9.6.95 Confirmed bat species recorded within the bat activity surveys included:

- common pipistrelle;
- soprano pipistrelle;
- Nathusius' pipistrelle;
- noctule;
- Leisler's bat; and
- serotine bat.

9.6.96 A number of calls of bats were not able to be identified to species level, these included bats from the long-eared group of bats (brown long-eared and grey long-eared) and bats from the *Myotis* group of bats (alcathoe bat, Bechstein's bat, Brandt's bat, Daubenton's bat, Natterer's bat and whiskered bat) were also recorded.

9.6.97 Some of these calls were more characteristic of a particular bat species including:

- Brandt's bat;
- Daubenton's bat;
- Natterer's bat; and
- whiskered bat.

9.6.98 Higher value foraging and commuting habitat was identified within the woodland areas in the east of the Project site, along woodland edges, river corridors and mature hedgerows and treelines.

9.6.99 The highest levels of bat activity were recorded throughout Horleyland Wood, around the eastern part of the LERL fields and along the Gatwick Stream and southern boundary of the LERL fields east of the railway.

9.6.100 Within Riverside Garden Park but outside of the Project site boundary, high levels of bat activity were recorded along the Gatwick Stream, around the lake and along the north west edge of the park, towards Longbridge roundabout.

9.6.101 In the west of the site the highest levels of activity were recorded along the woodland belt, west of the River Mole. Foraging and commuting activity was picked up within the wider fields east of the Gatwick Aviation Museum, predominantly this activity was associated with the field boundary hedgerows and mature tree lines.

9.6.102 Relatively little bat activity was picked up along the southern Project site boundary during the bat transects, compared with the other transect routes.

9.6.103 Overall, the continuity of connective habitat is likely to provide an extensive network of habitat features suitable for a wide range of commuting, foraging and roosting bats, providing links to the wider landscape in this area.

Static/Automated Surveys

9.6.104 A total of 11 static detector units were deployed across the survey area between April and October 2019 for a minimum of five nights per location per month. The units were positioned at various locations, in order to sample a broad range of the habitat types present on site but focusing on those likely to be of greatest value to bats. The static detector locations are shown in Appendix 9.6.2. The detectors were set out to record the same nights in each location, though equipment difficulties occasionally resulted in inconsistences between nights and some missing recordings, as detailed within Appendix 9.6.2.

9.6.105 The static detectors were located at:

- land west of the Fire Training Ground (Location 1);
- land south west of the River Mole (Location 2);
- Brockley Wood (Location 3);
- north of Long Stay North car park (Location 4);
- Riverside Garden Park (Location 5);
- land west of the railway (Location 6);
- Horleyland Wood (Location 7);
- LERL wetland (Location 8);
- Perimeter Road South (Location 9);
- land west of Car Park X (Location 10); and
- Crawter's Wood (Location 11).

9.6.106 Additional detectors were located along the transects in 2020 at:

- River Mole south of Brockley Wood (Location 12);
- Riverside Garden Park (Location 13); and
- Land north of A23 (Location 14).

9.6.107 At least nine bat species were recorded across the survey area, including passes made by barbastelle bat, Leisler's bat and Nathusius' pipistrelle.

Trapping Surveys

9.6.108 A total of 154 bats of nine species were captured over nine trapping nights between 28 May and 4 September 2019 in 20 different locations.

9.6.109 Bat species caught during the trapping surveys included:

- Bechstein's bat;
- Brandt's bat;
- Daubenton's bat;
- whiskered bat;
- whiskered/Brandt's bat;
- Natterer's bat;
- brown long-eared bat;
- common pipistrelle; and
- soprano pipistrelle.

DNA Analysis

9.6.110 Droppings were obtained from nine of the trapped small *Myotis* bats, which were all sent for DNA analysis. Eight of these samples were successfully analysed to species level, which confirmed the bats as being whiskered bats.

Radio-tracking Surveys

9.6.111 Twenty of the trapped bats were selected for radio-tracking. The species, sex, breeding status and bat identification numbers are shown in Table 9.6.4 below.

Table 9.6.4: The species, sex, breeding status and month of capture of bats tagged and radio tracked within the Project site and surrounding area in 2019.

Bat identification number	Trapping location	Trapping location ref.	Species	Sex	Breeding status	Month of capture
1	Crawter's Wood	3c	Brown long-eared bat	Female	Pregnant	May
2	Crawter's Wood	3c	Brandt's bat	Female	Pregnant	May
3	Crawter's Wood	3c	Bechstein's bat	Male	N/A	May
4	Crawter's Wood	3b	Whiskered bat	Female	Pregnant	May
5	Lower Picketts Wood	6a	Daubenton's bat	Female	Pregnant	May
6	Crawter's Wood	3a	Brown long-eared bat	Female	Lactating	July
7	Crawter's Wood	3b	Natterer's bat	Female	Lactating	July
8	Eastern boundary of Museum Field	1a	Bechstein's bat	Male	N/A	July
9	Horleyland Wood	5d	Bechstein's bat	Male	N/A	July

Bat identification number	Trapping location	Trapping location ref.	Species	Sex	Breeding status	Month of capture
10	Riverside Garden Park	4c	Bechstein's bat	Male	N/A	July
11	Horleyland Wood	5d	Daubenton's bat	Female	Lactating	July
12	Upper Picketts Wood	7a	Brown long-eared bat	Female	Lactating	July
13	Brockley Wood	2c	Brown long-eared bat	Female	Non-parous	September
14	Eastern boundary of Museum Field	1b	Bechstein's bat	Female	Juvenile (non-parous)	September
15	Eastern boundary of Museum Field	1a	Brown long-eared bat	Female	Juvenile (non-parous)	September
16	Crawter's Wood	3c	Whiskered bat	Female	Young adult (non-parous)	September
17	Brockley Wood	2a	Bechstein's bat	Male	Juvenile	September
18	Eastern boundary of Museum Field	1b	Bechstein's bat	Female	Non-parous	September
19	Riverside Garden Park	4c	Brown long-eared bat	Female	Post-lactating	September
20	Horleyland Wood	5e	Daubenton's bat	Female	Post-lactating	September

9.6.112 A total of ten confirmed roosting locations were identified from nine radio-tagged bats of five species. Additionally, eight estimated roosting locations were identified. Dusk emergence surveys were undertaken on eight of the confirmed roosts. The location of these roosts and counts of the roosts are provided in Appendix 9.6.3 and described below:

- woodland strip to the west of Brockley Wood (Bechstein's bat);
- to the east of the M23 (Daubenton's bat); and
- Upper Pickett's Wood (Daubenton's bat).

9.6.113 Key flightlines were identified for seven of the radio-tagged bats, which included four Bechstein's, one brown long-eared bat and two Daubenton's bat.

9.6.114 Bechstein's bats were recorded using various sections of the River Mole to commute between foraging areas, including the area of the River Mole to the west of Brockley Wood, the area south of Povey Cross Road and the area to the north of Brockley Wood. Flightlines for Bechstein's bats were also recorded along Man's Brook, to the south of Burlands Farm.

9.6.115 Flightlines were identified for one of the radio-tracked brown long-eared bats which was recorded using Man's Brook to the south of Burlands Farm.

9.6.116 Flightlines were identified for two Daubenton's bats; one from the roost location south along Burstow Stream to a large waterbody; and the second was identified from its roosting location in Upper Pickett's Wood through the woodland to the sewage work lakes.

9.6.117 Core foraging areas for radio-tracked Bechstein's bats were identified within the following areas:

- Museum Field;
- Charlwood Place Farm;
- woodland strip to the west of Brockley Wood;
- River Mole;
- woodland to the east of Shangri-La and south of Brook Farm;
- woodland strip to the south-west of the Project area, north of Charlwood Road;
- Riverside Garden Park;
- Upper Pickett's Wood; and
- woodland to the north of Crawley Sewage Treatment Works.

9.6.118 Foraging areas for non-target bat species (Brandt's bat, brown long-eared bat, Daubenton's bat, Natterer's bat and whiskered bat) were identified in similar locations to Bechstein's bats including:

- Brockley Wood;
- River Mole;
- woodland strip to the west of Brockley Wood;
- Upper Pickett's Wood
- Man's Brook;
- Lower Pickett's Wood;
- woodland to the south of Shipley Bridge; and
- hedgerows and woodlands to the south of Charlwood.

9.6.119 Full details of the roosting and foraging areas are discussed in Appendix 9.6.3.

Other Mammals

9.6.120 The desk study data showed that the west European hedgehog and harvest mice have been recorded within the Project site boundary.

9.6.121 Both are listed under Section 41 of the NERC Act (2006) and have suitable habitat through the Project site.

Terrestrial Invertebrate Assemblage

9.6.122 Several species designated under Section 41 of the NERC Act (2006) were identified by the desk study and the two biodiversity areas; the River Mole corridor (NWZ) and the area east of the railway (LERL), are recognised as being of raised invertebrate interest.

9.6.123 In 2019 an invertebrate habitat appraisal of areas outside of the biodiversity areas identified that the land south of the Aviation Museum and west of the Fire Training Ground, Museum Field and the land to the north and west of it, the artificial earth noise bund and Pentagon Field all had features of moderate invertebrate interest above the expected regional background level.

9.6.124 On-going monitoring by GAL of the NWZ and LERL biodiversity areas has identified a diverse assemblage of terrestrial invertebrates in these areas. Follow up detailed surveys in 2020 confirmed this, including a range of scarce and unusual species.

Aquatic Invertebrates

9.6.125 Several species designated under Section 41 of the NERC Act (2006) were identified by the desk study.

9.6.126 In 2019, the invertebrate habitat appraisal identified that Pond M and the ditches adjacent to Pentagon Field had features of moderate invertebrate interest above the expected regional background level.

9.6.127 Further detailed assessment of the River Mole and Gatwick Stream found both watercourses supported macroinvertebrate communities indicative of moderately polluted conditions, exacerbated by relatively low flow conditions and high levels of sedimentation. Dense macrophyte growth on the River Mole is contributing to acute reductions in dissolved oxygen which are impacting on the macroinvertebrate assemblage.

9.6.128 There is presence of one record from 2013 of shining ram's-horn snail, an IUCN Red List species and UK species of principal importance under the 2006 NERC Act. Although not recorded during the survey, there remains a possibility that the species may occur at the site of the 2013 record at the downstream end of the desk study area.

9.6.129 The Gatwick Stream appears to be impacted by both organic pollution and silt deposition, possibly from a storm water discharge outlet from a nearby industrial area.

9.6.130 The invasive New Zealand mud snail was identified at the River Mole and Gatwick Stream sites, and signal crayfish were observed at both the Gatwick Stream sites during each visit.

Fish

9.6.131 The desk study identified that brown trout had previously been recorded within the Project site boundary, although it was not recorded in surveys in 2020. Brown trout is listed under Section 41 of the NERC Act (2006).

9.6.132 Both the River Mole and Gatwick Stream had consistently high fish populations. This is likely to be a consequence of stable temperature and DO conditions caused by shading and potentially high abundances of pollution tolerant macroinvertebrates such as *Oligochaete* worms as a food source.

Summary of Nature Conservation Interest and Identification of Important Ecological Features (IEFs)

9.6.133 The majority of the Project site comprised common and widespread habitats that were not protected and no statutory designated sites were present within the site boundary. One non-statutory designated site, Horleyland Wood LWS was present within the Project site boundary. Areas of ancient woodland were also present in the east of the site; Horleyland Wood and woodland to the east of it; and Brockley Wood.

9.6.134 The Project site boundary also includes the following Habitats of Principal Importance which are recognised under section 41 of the NERC Act (2006), including hedgerows; woodland; rivers and

ponds (ponds where protected and notable species have been recorded). A total of two protected plants (bluebell and pennyroyal) were recorded within the Project site boundary and were associated with higher value habitats including ponds and woodland.

9.6.135 The areas of hardstanding, amenity grassland, poor semi-improved grassland, scrub and tall ruderal vegetation were not considered to be IEFs. The areas of hardstanding and amenity grassland were of no to very low ecological value and were not considered important habitats. The other habitats were either relatively young and did not display the characteristics of a more established habitat or had low species or structural diversity and were therefore not considered important habitats.

9.6.136 The site was found to support a variety of breeding birds and foraging and commuting bats utilising the various habitats present. Populations of GCN and grass snake were present.

9.6.137 Signs of otters were not identified within the Project site boundary during surveys, but they are known to occur along watercourses within the wider area and due to their large territories, there is potential for them to utilise the habitats within the Project site boundary.

9.6.138 A number of Species of Principal Importance under section 41 of the NERC Act (2006) were also found to be present during field surveys (common toad) and from the desk study. Records of harvest mouse and hedgehog were provided in the desk study from within the Project site boundary and they are therefore also considered in the assessment.

9.6.139 Dormice and water voles were not found to be present and are not therefore considered further in this assessment at this stage. In the event that survey effort or records identify their presence, these will be considered within the ES.

9.6.140 Additionally, data relating to bat trapping/radio tracking and thermal imaging collision risk surveys are being analysed and will be presented in the ES.

9.6.141 IEFs comprising designated sites, habitats and species that could be affected by the Project and which are of particular nature conservation interest or concern are identified in Table 9.6.5 below.

Table 9.6.5: Important Ecological Features

IEF	Value of IEF	Covering legislation and guidance
Designated Sites		
Ashdown Forest SPA and SAC	International	Conservation of Habitats and Species Regulations 2017, as amended
Mole Gap to Reigate Escarpment SAC	International	Conservation of Habitats and Species Regulations 2017, as amended
Thames Basin Heaths SPA	International	Conservation of Habitats and Species Regulations 2017, as amended
Thursley Ash, Pirbright & Chobham SAC	International	Conservation of Habitats and Species Regulations 2017, as amended
The Mens SAC	International	Conservation of Habitats and Species Regulations 2017, as amended

IEF	Value of IEF	Covering legislation and guidance
Ebernoe Common SAC	International	Conservation of Habitats and Species Regulations 2017, as amended
Glover's Wood SSSI	National	Wildlife & Countryside Act 1981 (and as amended). Supports NERC Act (2006) Section 41 Habitats of Principal Importance
House Copse SSSI	National	Wildlife & Countryside Act 1981 (and as amended). Supports ancient woodland and NERC Act (2006) Section 41 Habitats of Principal Importance
Hedgecourt SSSI	National	Wildlife & Countryside Act 1981 (and as amended). Supports NERC Act (2006) Section 41 Habitats of Principal Importance
Buchan Hill Ponds SSSI	National	Wildlife & Countryside Act 1981 (and as amended). Supports NERC Act (2006) Section 41 Habitats of Principal Importance
Willoughby Fields LNR	County	Section 21 of the National Parks and Access to the Countryside Act 1949, and amended by Schedule 11 of the NERC Act (2006)
Grattons Park LNR	County	Section 21 of the National Parks and Access to the Countryside Act 1949, and amended by Schedule 11 of the NERC Act (2006)
Edolph's Copse LNR	County	Section 21 of the National Parks and Access to the Countryside Act 1949, and amended by Schedule 11 of the NERC Act (2006)
Waterlea Meadow LNR	County	Section 21 of the National Parks and Access to the Countryside Act 1949, and amended by Schedule 11 of the NERC Act (2006)
Worth Way CP	County	Countryside Act 1968
Tilgate Forest LNR	County	Section 21 of the National Parks and Access to the Countryside Act 1949, and amended by Schedule 11 of the NERC Act (2006)
Tilgate Park CP	County	Countryside Act 1968
Target Hill Park LNR	County	Section 21 of the National Parks and Access to the Countryside Act 1949, and amended by Schedule 11 of the NERC Act (2006)
Buchan CP	County	Countryside Act 1968
Broadfield Park LNR	County	Section 21 of the National Parks and Access to the Countryside Act 1949, and amended by Schedule 11 of the NERC Act (2006)
Horleyland Wood LWS (LWS within Project site boundary)	County	Considered in local authority policies under the domestic planning regime with applications made to local authorities

IEF	Value of IEF	Covering legislation and guidance
LWS, SNCI and DRV outside of site boundary (x32)	County	Considered in local authority policies under the domestic planning regime with applications made to local authorities
Habitats		
Ancient woodland (Horleyland Wood, woodland north of River Mole, woodland to east and Brockley Wood)	Regional	Designated ancient woodland
Semi-natural broadleaved woodland and mature broadleaved trees	County	NERC Act (2006) Section 41 Habitats of Principal Importance
Hedgerows	County	NERC Act (2006) Section 41 Habitats of Principal Importance
Watercourses	County	NERC Act (2006) Section 41 Habitats of Principal Importance
Ponds (NERC S.41)	County	NERC Act (2006) Section 41 Habitats of Principal Importance
Ponds (non-NERC S.41)	Local	Not qualifying under NERC Act (2006) Section 41 but supporting high species diversity
Semi-improved neutral grassland (NVC MG9)	Local	Not qualifying under NERC Act (2006) Section 41 but supporting high species diversity
Marshy grassland	Local	Not qualifying under NERC Act (2006) Section 41 but supporting high species diversity
Broadleaved plantation woodland and associated scrub	Local	Not qualifying under NERC Act (2006) Section 41 but providing a habitat connection.
Species		
Flora: Bluebell and pennyroyal	Local	Listed under Schedule 8 of the Wildlife & Countryside Act 1981 (and as amended)
Flora: Lesser quaking grass, narrow-lipped helleborine, ragged robin and solomon's seal	Local	Listed under the Vascular Plant Red List Data for Great Britain – 2006 as Nationally Scarce or Nationally Threatened
Breeding birds (confirmed or possible) peregrine	Regional	Listed under Section 1 Schedule 1 of the Wildlife & Countryside Act 1981 (and as amended)
Breeding bird assemblage including species of conservation interest (confirmed or possible); mallard, kestrel, stock dove, skylark, grey wagtail, dunnock, song thrush, mistle thrush, marsh	County	Listed under Section 1 of the Wildlife & Countryside Act 1981 (and as amended) and some NERC Act (2006) Section 41 Species of Principal Importance and BoCC Red or Amber listed species

IEF	Value of IEF	Covering legislation and guidance
tit, starling, house sparrow, linnet, bullfinch and reed bunting		
Wintering birds	Local	No species recorded in numbers of national or international significance. NERC Act (2006) Section 41 Species of Principal Importance and BoCC Red or Amber listed species.
Grass snake	Local	Listed under Schedule 5 of the Wildlife & Countryside Act 1981 (and as amended) and NERC Act (2006) Species of Principal Importance
Great crested newt	Local	GCN are protected through inclusion in the Habitats Regulations. They are an EPS and as such any development works which could affect an EPS may require a licence from Natural England to comply with the Habitats Regulations. They are also NERC Act (2006) Section 41 Species of Principal Importance
Common toad	Local	NERC Act (2006) Section 41 Species of Principal Importance
Badger	Local	Badgers are protected under the Protection of Badgers Act 1992.
Otter	County	Otters are protected through inclusion in the Habitats Regulations. They are an EPS and as such any development works which could affect an EPS may require a licence from Natural England to comply with the Habitats Regulations. They are also NERC Act (2006) Section 41 Species of Principal Importance
Bats: Bechstein's bat and barbastelle bat	County	All bat species are protected through inclusion in the Habitats Regulations. They are an EPS and as such any development works which could affect an EPS may require a licence from Natural England to comply with the Habitats Regulations. Barbastelle, Bechstein's, noctule, soprano pipistrelle and brown long-eared bats are NERC Act (2006) Section 41 Species of Principal Importance. Bechstein's bat and barbastelle are Rare in the UK and the distribution of alcathoe is unknown.
Assemblage of other bat species	Local	
Dormouse	Local	Otters are protected through inclusion in the Habitats Regulations. They are an EPS and as such any development works which could affect an EPS may require a licence from Natural England to comply with the Habitats Regulations. They are also NERC Act (2006) Section 41 Species of Principal Importance.
Harvest mouse	Local	NERC Act (2006) Section 41 Species of Principal Importance

IEF	Value of IEF	Covering legislation and guidance
Hedgehog	Local	NERC Act (2006) Section 41 Species of Principal Importance
Fish	Local	Good species assemblage
Shining ramshorn snail	Local	IUCN Red List, NERC Act (2006) Section 41 Species of Principal Importance
Terrestrial invertebrate assemblage	County	Diverse assemblage including scarce and rare species

Future Baseline Conditions

9.6.142 The EIA Regulations require consideration of the likely changes to baseline conditions over time, taking into consideration the future development at Gatwick Airport without the Project. Therefore, an assessment of the future baseline conditions has been carried out and where relevant, have been factored into the assessment below.

Future Development Proposals

9.6.143 Improvements outside of the scope of the Project that have either already been consented or are committed (and do not require consent), including works being undertaken by other parties, considered within this section are:

- extension to Pier 6, including alternations to Taxiway Quebec and reconfiguration of aircraft stands;
- normal or planned maintenance and asset replacement programme for the main runway, including resurfacing of the main runway and replacement of the Instrument Landing System (ILS) localisers in accordance with the usual maintenance schedule;
- multi-storey car park 4 (1,500 vehicles);
- multi-storey car park 7 (2,750 vehicles);
- use of robotics technology within existing long stay parking areas to increase capacity, resulting in an additional 2,500 spaces;
- highway improvements to North Terminal and South Terminal roundabouts, signalisation and signage;
- extension to the existing BLOC hotel (approximately 200 additional bedrooms);
- reconfiguration of the existing Hilton hotel to provide 50 additional bedrooms; and
- Gatwick Station improvements.

Climate Change

9.6.144 The UK Climate Projections 2018 (Met Office, 2019) have stated that by 2070, in a high emissions scenario, the UK average temperature is expected to rise between 0.9 C-5.4°C in the summer and 0.7°C -4.2°C in winter.

9.6.145 The relationship between climate change and biodiversity in the UK has been summarised by the Inter-Agency Climate Change Forum (IAACCF, 2010). They have found that the impact on species of increased temperatures includes changes in distribution and abundances, timing of seasonal events and the timing of when habitats are used. As a result, the overall species composition, habitats and ecosystem characteristics are likely to change.

Initial Construction Phase: 2024-2029

9.6.146 It is assumed that the baseline as reported above is unlikely to change significantly in this timescale.

2030-2032

9.6.147 By 2030, an increase in visitor numbers and construction of car parks that form part of the future baseline scenario would have minimal direct impact on biodiversity.

9.6.148 With the increase in people driving or commuting to the airport there would be a potential for increased air pollution which could have an effect on habitats that are specifically sensitive to changes in nitrogen deposition levels. However, the relatively small percentage change in traffic level, together with the distance between the more sensitive habitats (such as neutral semi-improved grassland) within the Project site and the main roads, means a wider impact on the overall habitat structure or species present is considered unlikely.

9.6.149 By 2030, species assemblages are likely to be showing signs of change due to climate change, with species from the continent not previously recorded around Gatwick Airport becoming more frequent.

9.6.150 The wetter areas, the River Mole corridor (NWZ), the LERL wetland area and ponds around the site could be showing signs of lower water levels during summer by this time, with complete drying out occurring earlier in ponds.

9.6.151 This could result in impacts on wetland species and species that spend part of their lifecycle in water such as GCN, frogs, toads and grass snake. These species may be showing signs of decreasing population sizes by this time, but it is considered unlikely that changes to their habitats would be substantial and therefore it is considered unlikely that these species would have been lost from the Project site. Monitoring of populations should be carried out at key stages.

2033-2038

9.6.152 By 2033, species assemblages which had shown signs of change due to climate change may continue to exhibit these with some further changes possible by 2038.

9.6.153 The wetter areas are likely to continue to become drier earlier in the season, which could continue to affect wetland species distribution and abundance. Monitoring of populations should continue during this period.

Design Year 2038

9.6.154 Due to climate change, there may be fewer waterbodies that hold water permanently and the rivers and streams around Gatwick could have a reduced flow impacting on invertebrate and fish species that rely on them. Breeding ponds for newts could dry out sooner and impact on the timeframe that GCN have to breed.

9.6.155 Monitoring of bat activity and GCN populations should be undertaken to identify the status of these species within the wider area.

9.7. Key Project Parameters

9.7.1 The assessment has been based on the parameters identified within Chapter 5: Project Description.

9.7.2 The Project site boundary encloses an area of 820 hectares. The majority of this area is the existing operational airport and configuration of habitats would remain largely unchanged. Individual elements of the Project which would affect habitat loss are identified in Figures 5.2.1a to 5.2.1h.

9.7.3 Table 9.7.1 below identifies the key parameters relevant to this assessment. Where options exist, the maximum design scenario selected is the one having the potential to result in the greatest effect on an identified receptor or receptor group. Effects of greater adverse significance are not predicted to arise should any other option identified in Chapter 5 be taken forward in the final design of the Project.

Table 9.7.1: Maximum Design Scenarios

Potential Impact	Maximum Design Scenario	Justification
Initial Construction Phase: 2024-2029		
Complete loss (temporary or permanent) of all existing habitats within the areas proposed for development as part of the Project between 2024 and 2029.	Construction of the full extent of the land within the boundaries of each element of the Project (excluding a 15 metre buffer around ancient woodland).	The loss of the full extent of the habitats within the boundaries would be the maximum design scenario resulting in the greatest area of habitat loss and disturbance.
2030-2032		
Complete loss (temporary or permanent) of all existing habitats within the areas proposed for development as part of the Project between 2030 and 2032.	Construction of the full extent of the land within the boundaries of each element of the Project (excluding a 15 metre buffer around ancient woodland).	The loss of the full extent of the habitats within the boundaries would be the maximum design scenario resulting in the greatest area of habitat loss and disturbance.
Reduction in predicted area of neutral grassland, marshy grassland, woodland and trees, shrubs and hedgerows. Loss of habitat for bats, GCN and grass snake.	Habitat creation not reached desired level of establishment or partially failed.	The maximum effects could occur if the habitat creation associated with the maximum design scenario either fails partially or establishes less quickly than expected. A complete failure of habitat creation is considered unlikely.
Reduction in GCN, grass snake, bats.	Mitigation not working as effectively or as quickly as expected.	The maximum effects that could occur would be a reduction in GCN and grass snake populations or a decrease in bat activity. A complete loss of

Potential Impact	Maximum Design Scenario	Justification
		population/activity is considered to be unlikely.
2033-2038		
Loss of young woodland and neutral semi-improved grassland providing suitable terrestrial habitat for GCN and potential for grass snake to be present.	Gatwick Stream flood compensation.	This option would affect higher quality habitats and affects protected species.
Unsuccessful habitat creation.	Habitat creation not reached desired level of establishment or partially failed.	The maximum effects could occur if the habitat creation associated with the maximum design scenario either fails partially or establishes less quickly than expected. A complete failure of habitat creation is considered unlikely.
Reduction in GCN, grass snake, bats.	Mitigation not working as effectively or as quickly as expected.	The maximum effects that could occur would be a reduction in GCN and grass snake populations or a decrease in bat activity. A complete loss of population/activity is considered to be unlikely.
Design Year: 2038		
Unsuccessful habitat creation.	Habitat creation not reached desired level of establishment or partially failed.	The maximum effects would occur if the habitat creation associated with the maximum design scenario either fails partially or establishes less quickly than expected. A complete failure of habitat creation is considered unlikely.

9.8. Mitigation and Enhancement Measures Adopted as Part of the Project

9.8.1 A number of measures have been designed into the Project to reduce the potential for impacts on ecology and nature conservation. These are listed in Table 9.8.1.

Table 9.8.1: Mitigation and Enhancement Measures

Measures Adopted as Part of the Project	Justification
Mitigation and Enhancement	
The locations of all pre-construction archaeology, ground investigation and unexploded ordnance surveys would be assessed for their potential impacts on ecology and nature conservation and appropriate	To minimise the impact of construction on features of ecology and nature conservation value.

Measures Adopted as Part of the Project	Justification
mitigation would be implemented. This would include altering survey locations where practicable to avoid damage to features of high value and watching briefs to ensure such features are not impacted upon.	
The Project has been developed to avoid designated sites, areas of woodland and other ecologically sensitive habitats wherever practicable.	To minimise the impact of construction on features of ecology and nature conservation value.
The Project has been designed to avoid areas of ancient woodland. Measures would be put in place to ensure a minimum 15 metre buffer is retained between ancient woodland and construction areas. Appropriately sturdy fencing would be erected around the 15 metre buffer to prevent access by people, materials or machinery.	To minimise loss of habitats of conservation interest.
Any other existing trees, scrub and hedgerows proposed to be retained and incorporated into the design for the Project would be protected during construction. Measures would be put in place to ensure that bat foraging/commuting habitat and areas of trees, hedge or scrub to be retained are adequately protected from damage or destruction during the construction phase of the Project. Protective fencing, in accordance with BS 5837, would be erected around these features to prevent access by people, materials or machinery. This would reduce the risk of accidental damage during construction activities.	To reduce impacts on protected or otherwise notable species.
Measures for the appropriate storage of materials and fuels and the management of dust during construction activities (such as the breaking up of the existing runway) and runoff would be implemented to avoid the pollution of designated sites and the local water environment during construction and operation. Measures proposed for the construction phase would be managed through the Code of Construction Practice (CoCP). An outline CoCP is provided at Appendix 5.3.1.	To minimise the impact of construction on features of ecology and nature conservation value.
Where practicable, the small areas of semi-natural broadleaved woodland due to be lost would be cleared sensitively so that bluebell bulbs could be collected and replanted within new woodland.	To reduce impacts on protected species.
Surface access works undertaken along the margins of Pond F, or within close proximity to it, would be undertaken following an ecology method statement and with an Ecological Clerk of Works present to reduce the likelihood of effects on pennyroyal.	To reduce impacts on protected species.
Suitable habitat for breeding birds would be cleared between October and mid-February, outside of the breeding bird season as far as practicable. Where this is not feasible the vegetation, building or structure due to be removed would first be inspected by a suitably qualified ecologist. Any active nests would be retained along with a minimum 5 metre buffer around them. The buffer around more sensitive birds and birds listed on Schedule 1 of the Wildlife and	To reduce impacts on protected or otherwise notable species.

Measures Adopted as Part of the Project	Justification
Countryside Act (1981) (as amended) would be increased, to avoid disturbance.	
Additional breeding bird surveys would be undertaken prior to construction commencing to determine the presence or absence of Schedule 1 species; peregrine, little ringed plover and firecrest.	To reduce impacts on protected species.
Any nest of a Schedule 1 species found to be active during construction works would be protected by a suitably sized buffer that would be identified by a suitably experienced ornithologist. Where necessary, such nests would be monitored during construction by the ornithologist for signs of disturbance and where necessary methods would be altered to prevent it.	To reduce impacts on protected species.
At least part of the mitigation area in the west of the site would be managed to provide a suitable nesting site for skylark.	To minimise the impact of construction on features of ecology and nature conservation value.
Previous work on bird strike risks and management has been taken into consideration during the design process, including in the chosen locations and specification of new landscape planting.	To minimise the impact of operation on features of ecology and nature conservation value.
Receptor areas for GCN and grass snake would be prepared, and the species translocated into these areas, using appropriate methods and timings prior to construction commencing within suitable habitats.	To reduce impacts on protected species.
Areas of lower value reptile habitat that could support low numbers of grass snake, such as the drainage ditches and tree lines around and within car parks, would be cleared sensitively with an ecological clerk of works present.	To reduce impacts on protected species.
Active badger setts that would be damaged or destroyed, or which could result in badgers using them being disturbed, would be closed using appropriate methods and timings.	To reduce impacts on protected species.
The following measures would be implemented to ensure that no badgers are harmed during the construction phase: ▪ suitably sturdy fencing to be erected around all construction works to deter foraging badgers from the works' areas; ▪ any excavated holes to have a wooden board placed in them over night so as to provide a means of escape should any badgers accidentally enter the excavation; and ▪ any chemicals to be securely stored at night in a locked container. In order to avoid attracting badgers to the works area any food waste would be disposed of in appropriate bins or removed from site at the end of each day.	To reduce impacts on protected species.
Lighting during both construction and operation would be designed in order to avoid disturbance to areas of value for bats by directing lighting towards working areas and shielding adjacent habitats of value. Measures proposed for the construction phase would be managed	To reduce impacts on protected species.

Measures Adopted as Part of the Project	Justification
through the Code of Construction Practice (CoCP). An outline CoCP is provided at Appendix 5.3.1.	
Creation of new, high value habitats comprising a mixture of wet and dry neutral grasslands along the new channel of the River Mole and within the Museum Field and adjacent flood compensation areas to provide new habitats for grass snake and other fauna displaced during the diversion of the River Mole and construction of the flood compensation areas.	To minimise the impact of construction on features of ecology and nature conservation value.
Creation of new, high value habitats comprising neutral and marshy grassland within Gatwick Stream flood compensation area in the east of the Project site to mitigate for habitats lost and to create new habitats for grass snake and GCN displaced during the construction of the flood compensation area.	To minimise the impact of construction on features of ecology and nature conservation value.
Creation of new habitats within a newly created mitigation area in the western part of the Project site comprising woodland, scrub planting, grassland creation and wetland/pond creation.	To minimise the impact of construction on features of ecology and nature conservation value.
Tree and shrub planting to compensate for loss of existing habitat, to provide nesting sites for breeding birds and to maintain and enhance connectivity for foraging and commuting bats.	To minimise loss of habitats of conservation interest and to reduce impacts on protected species. To improve habitat connectivity around the perimeter of the site for bats.
Woodland creation to compensate for loss of existing habitat, to provide nesting sites for breeding birds and to maintain connectivity for foraging and commuting bats to compensate for the loss of woodland, scrub and hedgerow due to highway improvements. New woodland would be created along new road alignments and within areas connecting to it where feasible to do so.	To minimise loss of habitats of conservation interest and to reduce impacts on protected species.
Restoration of temporary land take to habitats of existing or greater ecological value.	To minimise loss of habitats of conservation interest.
The retention of a strip of woodland between the Gatwick Stream and new highway alignments/water attenuation area to retain a dark corridor and well-used bat foraging and commuting route.	To minimise loss of habitats of conservation interest and to reduce impacts on protected species.
An existing non-native hedgerow comprising *Leylandii* between the A23 London Road and Perimeter Road East would be replaced with a native species-rich hedgerow, subject to evaluation in relation to the airport safeguarding requirements that wildlife strike hazard should not increase.	To strengthen habitat connectivity east of the airfield.
Provision of bat roost features within higher value habitats away from the airfield and suitable for the species present.	To compensate for loss of existing bat roost features.
Landscape planting to include a variety of native trees and shrubs and wildflower grasslands.	To provide habitats of conservation interest and improve habitat connectivity.

Measures Adopted as Part of the Project	Justification
Tree and shrub planting to reinforce retained tree lines within existing car parks and to improve habitat connectivity across them.	To provide habitats of conservation interest and improve habitat connectivity.
Creation of a new pond designed to provide a high value habitat for aquatic flora, invertebrates and amphibians within a mitigation area.	To provide habitats of conservation interest.
Woodland creation and tree and shrub planting.	To provide habitats of conservation interest and improve habitat connectivity.
Diversion of the River Mole would create an increased length of channel with a more natural profile.	To provide habitats of conservation interest.
The airfield satellite construction compound would occupy land outside of the River Mole diversion footprint to allow the new river channel to establish early in the Project. A minimum 8 metre buffer would be created along the channel.	To provide habitats of conservation interest.
Creation of refugia and hibernacula within newly created habitats for GCN and grass snake.	To provide habitats of conservation interest.
Creation of south facing mosaic of grassland with occasional scrub to provide suitable habitat for a variety of terrestrial invertebrates and grass snake on the northern bank of the newly diverted section of the River Mole and the area to the north of it.	To enhance terrestrial invertebrate and grass snake habitat.
Monitoring	
Monitoring of GCN and grass snake populations affected.	To determine success of mitigation and identify remedial measures if required.
Monitoring of bat activity.	To determine success of mitigation and identify remedial measures if required.
Monitoring of badger setts.	To determine success of mitigation and identify remedial measures if required.

9.9. Assessment of Effects

Pre-Construction: Up to 2024

9.9.1 A number of pre-construction surveys would be undertaken, including intrusive surveys such as ground investigation excavations and archaeological trial trenching, together with unexploded ordnance surveys. The mitigation measures designed into the Project would ensure that high value habitats would be avoided as far as practicable and that any localised impacts on habitats for protected species, such as nesting birds, grass snake and GCN would be avoided.

9.9.2 Effects would be controlled through the CoCP, which would ensure that ecological constraints are taken into account in agreeing the locations and methodologies for these pre-construction works.

Initial Construction Phase: 2024-2029

Statutory Designated Sites

9.9.3 There are no statutory designated sites within the Project site boundary. The nearest statutory designated site of County importance is Willoughby Fields LNR, located approximately 786 metres from the site. The nearest site of national importance is Glover's Wood SSSI, located approximately 1.6 km away, while the nearest site of international importance is Mole Gap to Reigate Escarpment SAC, approximately 9.2 km away.

9.9.4 Due to the distance between the statutory designated sites and the Project site boundary, and the mitigation measures designed into the Project to ensure that possible pollutants are prevented from reaching them, the construction of the Project would have no impact on statutory designated sites. Further details of the pollution control measures that would be put in place can be found in Appendix 5.3.1. There would be no effect arising at designated sites as a result of loss or alteration to the habitats or disturbance or harm to species present. Given this, the magnitude of impact and significance of effect on these international, national and county value receptors would be **no change** and therefore not significant. Further details of effects on internationally designated sites are provided in Appendix 9.9.1.

Non-statutory Designated Sites

9.9.5 There is one non-statutory designated site within the Project site boundary: Horleyland Wood LWS, which is ancient woodland.

9.9.6 Works to construct a new car park would be undertaken to the east (at Pentagon Field) with the nearest construction works being 300 metres away. Construction works on the airfield associated with new taxiways would be approximately 200 metres away at the nearest point but separated from the woodland by a railway, main A road (A23) and further car parking.

9.9.7 The remaining non-statutory designated sites are more than 600 metres from the Project site boundary and are therefore less sensitive to effects from construction.

9.9.8 Mitigation measures designed into the Project, including installing protective fencing around retained vegetation and ensuring that possible pollutants are prevented from reaching the non-statutory designated sites, would ensure that the Project would have no impact upon Horleyland Wood LWS. There would therefore be no effect due to loss or alteration to the habitats or disturbance or harm to species present. As such, the magnitude of impact and significance of effect on these County value receptors would be **no change** and therefore not significant.

Ancient Woodland

9.9.9 Four areas of ancient woodland are present within the Project site boundary: Horleyland Wood; Lower Picketts Wood; Brockley Wood and a section of woodland along the north west side of the River Mole. The potential impacts from contamination from pollution events and the measures to protect Horleyland Wood are described above for non-statutory designated sites.

9.9.10 These measures would also be relevant to Lower Picketts Wood to the east which would be in close proximity to the construction of car parking at Pentagon Field. The mitigation measures designed into the Project would ensure a minimum 15 metre buffer was retained and protected along the boundary of the woodland to protect it.

9.9.11 Ground levels at Pentagon Field would be raised prior to the construction of the car park. No infill materials would be placed within 15 metres of Lower Picketts Wood to ensure the root protection area of the trees within the woodland was protected.

9.9.12 The proposed decked car park at Pentagon Field is located to the north of Lower Picketts Wood and therefore would not result in the shading of the woodland. Similarly, the increased ground level would not result in any increase in shading.

9.9.13 Construction works associated with creating the airfield satellite contractor compound and diversion of the River Mole corridor would be undertaken in proximity to Brockley Wood, resulting in the loss of some of the habitats to the south of it for the full construction period (2024-2035 in the case of the contractor compound). A minimum 15 metre buffer would be provided around this area of woodland to ensure it was protected from accidental damage. The security fencing around the compound would be at least 15 metres from the woodland edge, thereby ensuring there could be no access by personnel and machinery and that no materials would be stored within or adjacent to it.

9.9.14 A lighting strategy for the construction period will be developed to identify the type of lighting to be used and measures to be implemented to reduce light spill, taking into account effects on nearby sensitive receptors, such as ancient woodland.

9.9.15 Implementation of the mitigation described above would ensure that the Project would have no impact upon ancient woodland during the construction phase. There would be no impact resulting in loss or alteration to the habitats or increased disturbance. Given this, the magnitude of impact and significance of effect on this receptor of regional value would be **no change** and therefore not significant.

9.9.16 An assessment of the effects of air quality on ancient woodland will be included in the ES.

Habitats

Semi-natural Broadleaved Woodland and Mature Broadleaved Trees

9.9.17 Areas of semi-natural broadleaved woodland and individual broadleaved trees would be lost due to the following construction works that would require site clearance between 2024 and the end of 2029.

- Diversion of River Mole corridor.
- Construction of hotel and multi-storey in existing Car Park H.
- Replacement ‘Purple Parking’ at Crawter’s Field.
- Pentagon Field parking.
- Museum Field flood compensation/storage area.
- East of Museum Field flood compensation area.
- Car Park X flood compensation area.
- Noise mitigation feature.
- Set up of airfield satellite contractor compound on land south of Brockley Wood.
- Surface access satellite contractor compounds for South and North Terminal roundabout improvements.
- Improvements to North Terminal roundabout.
- Alterations to Longbridge roundabout.

9.9.18 The improvements to the North Terminal roundabout may require construction works and working areas to be created within the highway boundary along the southern edge of Riverside Garden Park. This could potentially result in the direct loss of a relatively thin strip of plantation broadleaved woodland (highway planting). Woodland to the north would be retained, ensuring a substantial amount of the existing woodland would remain present. This would ensure habitat connectivity is not lost.

9.9.19 The mitigation measures designed into the Project would ensure retained areas of woodland adjacent to working areas are protected from physical damage.

9.9.20 Upon completion of the works, new areas of broadleaved woodland would be created along the new highway alignment to compensate for the loss and to strengthen habitat connectivity. Additional woodland planting would have already been undertaken in other areas within the Project site boundary to further compensate for the loss. The woodland would still be young in 2029 and would therefore not directly compensate for the loss of any woodland until it had matured.

9.9.21 Replacement Purple Parking at Crawter's Field would also result in the loss of semi-natural broadleaved woodland at the western end of Crawter's Wood. A woodland buffer would be retained along the southern boundary of the woodland, thereby ensuring habitat connectivity and a dark corridor would be retained and the overall loss of habitat would be small in relation to the overall habitat resource present in this part of the Project site.

9.9.22 The retained woodland strip would be protected during construction and new broadleaved woodland planting would be undertaken elsewhere within the Project site boundary to compensate for the loss.

9.9.23 Some of the construction works listed above would result in the loss of small areas of semi-natural broadleaved woodland, which would result in the loss of small areas of woodland in the context of existing larger woodland areas. Therefore, despite the loss, areas of woodland would be retained in each location. Individual broadleaved trees would also be lost from some of the locations, including small clumps of trees and tree lines. No veteran trees would be lost.

9.9.24 Woodland and tree planting would be undertaken early in the Project programme to compensate for this loss. However, there would be a long-term loss of woodland and trees due to the amount of time it would take for the new planting to reach maturity.

9.9.25 The combined loss of semi-natural broadleaved woodland and trees would result in a long-term, low magnitude impact to a receptor of County importance resulting in a **minor adverse** significance of effect which is not considered to be significant.

Hedgerows

9.9.26 The reconfiguration of airport facilities in 2024-2025 associated with relocating the CARE facility (Option 2), motor transport facilities and Rendezvous Point North and the construction of the North Terminal Long-stay Car Park would result in the loss of species-poor hedgerows within existing car parking areas**.** The hedgerows are relatively low value habitats due to their locations within large areas of hard standing and their low species diversity.

9.9.27 Landscape planting would be undertaken around the new facilities and car parking that would include the creation of native, species-rich hedgerows to compensate for those lost. However,

this would not occur until after the works were complete (likely winter 2030/31 and 2032/33). There would be a medium-term loss of hedgerows followed by a long-term increase in hedgerow value, due to species-poor hedgerows being replaced with species-rich hedgerows. The overall impact would be negligible on a receptor of County importance resulting in a **negligible** significance of effect.

9.9.28 The improvements to the South Terminal roundabout would result in the loss of species-poor hedgerow with trees during site clearance in 2029. The hedgerow in this area forms part of an east-west habitat corridor also comprising scrub and broadleaved plantation woodland which would also be lost.

9.9.29 This would result in the medium-term loss of a species-poor hedgerow and trees, being of County importance and a reduction in habitat connectivity. This loss would be compensated for through the planting of native, species-rich hedgerows once the highways works were complete. However, there would be a loss of habitat and connectivity during the construction phase and until any new planting had established.

9.9.30 When considered in combination with the loss of broadleaved plantation woodland and scrub, this would result in a medium-term medium magnitude of impact to a receptor of County importance resulting in a **moderate adverse** significance of effect.

9.9.31 Additional hedgerow planting would be undertaken early in the construction period along Larkins Road and between the A23 London Road and Perimeter Road East to provide an increase in the amount of hedgerow on the Project site and to enhance connectivity across it.

9.9.32 This would result in a long-term medium magnitude impact to a receptor of County importance resulting in a **moderate beneficial** significance of effect.

Watercourses

9.9.33 General airfield construction activities and the start of the construction of the North and South Terminal roundabout improvement works have the potential to impact on all watercourses. Best practice measures to mitigate the construction impacts (implemented through the CoCP and reported in Chapter 11: Water Environment) would substantially control impacts and no significant effects have been identified.

9.9.34 Flood compensation works would be undertaken in the west and south of the site. This would include the construction of a new channel connecting the River Mole to the Museum Field and east of Museum Field flood compensation areas and the construction of a new channel connecting the River Mole to the Car Park X flood compensation area.

9.9.35 The construction of the new channels would result in the short-term loss of two small sections of the existing riverbank where they connect. In the long-term, new bank side habitats would develop along the new channels resulting in a net increase in bankside habitats.

9.9.36 Mitigation measures would be put in place to protect the River Mole from potential pollution events through appropriate measures to contain them. This would include limiting the amount of sediment entering the stream during channel construction.

9.9.37 There would be a short-term impact on the river when the flood compensation works are undertaken. Given that a very short stretch of the river would be affected, this would result in a

short-term, negligible impact to a receptor of County value resulting in a **negligible** significance of effect.

9.9.38 The creation of new bankside habitats and channels, connecting flood compensation areas to the River Mole, that are intermittently wet would increase the overall habitat resource. This would result in a long-term, low impact to a receptor of County value resulting in a **minor beneficial** significance of effect.

9.9.39 A short section of the River Mole would be diverted as part of the Project. During the construction phase this would involve constructing a new channel and diverting the existing river into it between 2024 and 2025. Flora and fauna from the existing channel would be translocated into the new channel. The existing section of river would then be infilled.

9.9.40 There would be a medium-term negative impact on the river when first constructed due to the small loss of part of the original channel and before flora have not fully established and associated fauna have not colonised the new channel. Given that a relatively short stretch of the river would be affected, this would result in medium-term, low impact to a receptor of County value resulting in a **minor adverse** significance of effect.

9.9.41 In the long-term, new and translocated habitats and species would be establishing within the new channel. Habitats adjoining the new river corridor would also be restored to grassland from 2035 when the airfield satellite contractor compound would be decommissioned. This would result in a longer length of stream and associated habitats, designed to be of higher value than the section of river lost, resulting in a long-term, medium impact on a receptor of County value. This would result in a **minor beneficial** effect.

9.9.42 Any delays in the Project construction or failures in habitat or species establishment identified during monitoring would mean the realignment could continue to have a medium-term negative impact on the river. Given a relatively short stretch of the river would be affected, this would result in a medium-term, low impact to a receptor of County value resulting in a **minor adverse** effect.

Ponds (NERC S.41 Habitat)

9.9.43 No ponds qualifying as a NERC S.41 Habitat would be directly impacted by the Project. Measures to protect habitats of value designed into the Project, including pollution prevention measures and the erection of sturdy fencing around higher value habitats, would ensure that no adverse effects are likely. The magnitude of impact and significance of effect would be **no change**.

Ponds (not NERC S.41 Habitat)

9.9.44 Two ponds would be directly affected by the Project. Pond A and Pond FFJ would be removed during the period 2024 to 2025 to allow for the reconfiguration of the northern runway and taxiways. A new pond would be created to compensate for the loss of Pond A during the same period to the north of its current location and to the south of the newly diverted River Mole.

9.9.45 A new pond would also be created on land north-west of Ponds A and FFJ within a mitigation area at the same time that this area is established. It would be created specifically for wildlife and would therefore have the potential to develop into a higher value habitat than the ponds being lost.

9.9.46 Pond F would be affected due to the construction of a retaining wall along it to allow the rearrangement of the westbound access from the South Terminal roundabout. The retaining wall would be likely to be constructed using a sheet pile method. As such, there is the potential to cause an increase in silt within the pond during piling as well as disturbance of fish and other wildlife using it.

9.9.47 The permanent loss of Pond FFJ, the medium-term loss of Pond A, the medium-term disturbance to Pond F and the creation of a new pond that would be of value in the long-term, would result, in a medium-term, medium magnitude impact to a receptor of local value due to a reduction in the amount of pond habitat within the Project site boundary until new ponds had been created. This would result in a **minor adverse** effect. In the long-term, once the new ponds had established, the impact would be negligible. This would result in an overall low adverse impact to a receptor of local value resulting in a **minor adverse** significance of effect.

Semi-improved Neutral Grassland

9.9.48 Small areas of semi-improved neutral grassland would be temporarily lost during the construction of the airfield satellite contractor compound and the diversion of the River Mole in the west of the Project site, south of Brockley Wood and in the north east of the Project site due to the South Terminal roundabout improvements. There would be a long-term, temporary loss whilst the compound remains present between 2024 and 2035. Semi-improved neutral grassland would be recreated upon completion of all the works affecting the habitat. New areas of semi-improved neutral grassland would also be created within a mitigation area in the west of the Project site, early in the construction period. This would compensate for the remaining areas of grassland that would be lost from construction areas and increase the overall amount of neutral semi-improved grassland on the Project site by the end of the construction period. There would be an overall long-term, medium magnitude impact on a receptor of local value which would result in a **minor adverse** significance of effect when existing habitats were lost and before newly created habitats had established. This would be followed by an overall long-term, medium magnitude impact on a receptor of local value which would result in a **minor beneficial** significance of effect when construction is complete due to the long term net increase in the amount of semi-improved neutral grassland within the Project site.

Marshy Grassland

9.9.49 Areas of marshy grassland would be impacted in the west of the site due to the siting of the airfield satellite contractor compound and diversion of the River Mole corridor south of Brockley Wood and by the construction of a new channel connecting the River Mole to the East of Museum Field flood compensation area.

9.9.50 There would be an increase in the amount of marshy grassland in the long-term due to an increase in the amount of damp ground within the Museum Field and East of Museum Field flood compensation areas and along the diverted River Mole corridor in the west of the site. Therefore, there would be a net increase in the amount of marshy grassland.

9.9.51 A small area of marshy grassland would also be lost to provide an extension to the dog kennel pond in the north-west of the site.

9.9.52 There would be a medium-term, low adverse impact on a receptor of local value resulting in a **minor adverse** effect. This would be followed by a long-term medium beneficial impact resulting in a **minor beneficial** significance of effect.

Broadleaved Plantation Woodland and Associated Scrub

9.9.53 The siting of the South Terminal surface access satellite contractor compound in the north east of the Project site would result in the loss of a small amount of broadleaved plantation woodland and scrub, approximately 10 metres wide, in 2024 where access from the main carriageway to the compound is created.

9.9.54 Improvements to the South Terminal roundabout would result in the further loss of broadleaved plantation woodland and scrub in 2029. The woodland forms an east-west habitat corridor along the northern and southern boundaries of the existing South Terminal roundabout, M23 and Airport Way between the B2036 Balcombe Road and the mainline railway (approximately 675 metres long). The full extent of the plantation woodland to the north of the roundabout and road would be lost. The plantation woodland to the south is wider and therefore a strip of woodland would be retained to the south of the works.

9.9.55 In 2029, the improvements to the North Terminal roundabout would result in the loss of additional broadleaved plantation woodland that forms an east-west habitat corridor between the existing North Terminal roundabout and A23 London Road. This measures approximately 1.2 km long, although is already dissected by slip roads thereby limiting connectivity for some less mobile flora and fauna.

9.9.56 The improvements to the North Terminal roundabout would also result in the loss of some plantation woodland on the northern side of the A23 road. This would result in a slight reduction in habitat connectivity at the far eastern end where the existing woodland adjoins the mainline railway corridor.

9.9.57 The loss of habitat connectivity has been assessed in combination with the loss of semi-natural broadleaved woodland from the north of the North Terminal roundabout improvements and the loss of hedgerow from the South Terminal roundabout improvements, the effects of which are reported earlier. Overall, there would be a substantial decrease in the existing linear woody vegetation, which currently provides a near continuous connection from east to west through the north of the Project site. There would also be a greater distance from north to south between the linear strips of woody vegetation.

9.9.58 However, the trees and shrubs within the linear strips are typically less than 60 years old, having been planted when the roads were constructed and are therefore of less value than the more mature trees and shrubs present within the nearby Riverside Garden Park. Additionally, some of the surrounding habitats to which this habitat connects are low value, such as the airport and the M23 motorway.

9.9.59 Replacement native, broadleaved woodland would be planted upon completion of the improvements to the South Terminal roundabout in 2030 and to the North Terminal roundabout in 2032 to compensate for this loss.

9.9.60 Due to the amount of time needed for new woodland to establish sufficiently (approximately 30+ years) to compensate for the loss, the combined effect of the loss of woodland, hedgerow and

scrub along both sides of the A23 London Road would result in a long-term, high magnitude impact on a receptor of County value resulting in a **moderate adverse** significance of effect.

9.9.61 Woodland planting would start providing a benefit to biodiversity within approximately five years after planting by providing food and shelter for some invertebrates and small mammals, and potentially nesting sites for birds. The significance of the adverse effect would start reducing at this point but it would take at least 30 years for the full effect of the loss to be removed.

9.9.62 Once new woodland had established, there would be a small increase in the amount of broadleaved woodland present which would result in a long-term, low beneficial impact resulting in a **minor beneficial** significance of effect.

9.9.63 It is noted that the location of the South Terminal surface access satellite contractor compound is highlighted for long-term development by others (to build Horley Business Park).

Flora: Bluebell and Pennyroyal

9.9.64 The majority of the areas of semi-natural broadleaved woodland that would be lost at this stage of the Project were originally planted approximately 50 to 60 years ago and are therefore unlikely to support naturally occurring bluebell. Small areas of more mature woodland or tree lines connecting to areas of ancient woodland that would be affected south of Brockley Wood and within car parking areas in the east of the site would have greater potential to support them.

9.9.65 Mitigation measures to protect bluebell by collecting bulbs during the clearance of woodland and replanting them within woodland planted in the mitigation area would ensure the long-term impact on bluebells, which are of local value, would be low. This would result in a **minor adverse** significance of effect.

9.9.66 Sheet piling works along the northern margins of Pond F would not directly affect the location where pennyroyal is growing around it but there would be potential for accidental damage. Mitigation measures would be put in place to reduce the likelihood of such affects. Therefore, the Project could result in a medium-term, medium impact on a plant of local value resulting in a **minor adverse** significance of effect.

Flora: Lesser Quaking Grass, Narrow-lipped Helleborine, Ragged Robin and Solomon's Seal

9.9.67 No construction works would be undertaken within the locations where notable flora were noted. Measures to protect habitats of value from pollution events would ensure the plants are not affected. This would ensure there would be no change to the presence or distribution of the species due to the Project. The magnitude of impact and significance of effect would be **no change**.

Breeding Birds (Annex 1 EU Birds Directive and/or Listed under Schedule 1 of the WCA)

9.9.68 No Schedule 1 breeding birds were confirmed to be present and therefore no effects are currently foreseen. Further surveys will be undertaken to determine whether any Schedule 1 birds were breeding within the Project site boundary as a precaution prior to construction works commencing. Should Schedule 1 breeding birds be present, measures would be put in place to ensure they were not disturbed by any Project related work. This would include identifying appropriate buffers around the nest within which works that could lead to disturbance would be prohibited. The nests would also be closely monitored by suitably experienced ornithologists who

would undertake dynamic risk assessments to ensure mitigation measures were altered to further reduce the risk of disturbance if necessary.

Breeding Bird Assemblage (including NERC Species of Principal Importance and BoCC Red or Amber listed species)

9.9.69 The works due to be undertaken between 2024 and 2029 would result in the loss of a range of habitats suitable for breeding birds across the Project site, including buildings and structures as well as vegetation.

9.9.70 Areas of grassland, scrub and scattered trees would be impacted in the west of the Project site due to the siting of the airfield satellite contractor compound south of Brockley Wood, diversion of the River Mole corridor, construction of a noise mitigation feature and relocation of the fire training ground. The species assemblage in these areas includes reed bunting and kestrel, which are Amber listed species and song thrush and skylark, which are Red listed species.

9.9.71 In the long-term, Pond A and the diverted River Mole would create new areas of suitable habitat. A new area of marshy grassland would already have been created in the west of the site, near to the River Mole rerouting, and would be establishing during this period.

9.9.72 Species such as kestrel and song thrush are less likely to be affected by the construction works in this area given the large amount of alternative habitat within and immediately adjacent to the Project site boundary.

9.9.73 Reed bunting is predominantly associated with farmland and wetland habitat and therefore the loss of the pond, river corridor and marshy grassland in this area could adversely affect the amount of suitable breeding habitat. There would be a medium-term loss of pond and river corridor habitats and a long-term loss of marshy grassland whilst the works take place during the period 2024 to 2035 and during the time it would take for new habitats to establish.

9.9.74 Construction of flood compensation at Museum Field and East of Museum Field would result in the loss of farmland habitat that could be used by reed bunting, resulting in a loss of some alternative habitat nearby during the construction period 2024 to 2025. Further areas of suitable farmland would remain present within the wider area.

9.9.75 The completion of the Museum Field and East of Museum Field flood compensation areas would create a new, larger area of marshy grassland of higher value to reed bunting than the existing farmland once established after its creation in 2025. New marshy grassland would also be created within the diverted river corridor in 2025 when construction is complete and further areas would be created when the airfield satellite contractor compound becomes decommissioned in 2035. There would be a long-term increase in the amount of wetland habitats, post-2025 once new habitats have established with a further small increase post-2035, resulting in more habitat for reed buntings than those originally present.

9.9.76 Overall, there would be a loss of breeding habitat in the medium-term as a result of the Project resulting in a medium adverse impact on this species of County value resulting in a **moderate adverse** effect. This would be followed by a moderate increase in the amount of breeding habitat locally in the long-term, providing a low beneficial impact which would result in a **minor beneficial** effect. Overall, there would be a long-term, low adverse impact which would result in a **minor adverse** effect.

9.9.77 Skylark territories were recorded in the airside amenity grassland areas, adjacent to the runway in the south of the Project site. The diversion of utility works associated with Taxiway Juliet, the northern runway and associated spurs would impact upon suitable breeding habitat in this area through the displacement of skylark territories. However, the impacts arising during construction would be temporary and localised to the northern boundary of the runway where the works would be undertaken. Mitigation would be provided by creating alternative suitable habitat within the mitigation area in the west of the Project site during the initial stages of the Project. This would reduce the duration of the adverse impact of habitat loss to short-term. In the medium-term, once construction works are complete, new areas of suitable habitat would develop on the airfield. The short-term, low impact on skylark, which is of County value would result in a **minor adverse** effect.

9.9.78 The North Terminal Long Stay decked car park (phase 1) works, flood alleviation works at Car Park X, Larkins Road diversion and relocation of CARE Option 2/motor transport/Rendezvous Point North are predominantly located within areas of existing hardstanding, bordered by scattered trees, scrub, ornamental planting and hedgerow. These features offer some value to nesting birds and some would be lost to the Project.

9.9.79 The stand amendments, reconfiguration of airport facilities and terminal extensions have the potential to disturb nesting sites for a variety of common species of breeding bird. There could be short to medium-term reductions in nesting site availability, but the construction of new buildings and structures will provide alternative nesting sites.

9.9.80 Areas of plantation woodland and broadleaved trees would be lost in areas proposed for a new hotel and surface car parking at multi-storey Car Park H in the north east of the site. A small area of woodland, scrub and broadleaved trees would also be lost around the periphery of the Project site due to new car parking at Pentagon Field and replacement Purple Parking at Crawter's Field.

9.9.81 The construction of the South Terminal surface access satellite contractor compound in the north east of the Project site in 2024, followed by the improvements to the South Terminal roundabout would result in the loss of a large amount of species-poor hedgerow with trees, scrub and broadleaved plantation woodland, which are suitable for breeding birds, including dunnock, bullfinch and song thrush (recorded during surveys undertaken in 2019). The loss of habitat associated with these works would be partially compensated for through the planting of native, species-rich hedgerows and woodland once the highways works are complete in 2030, although there would be a temporary, long-term loss until new planting is established.

9.9.82 At the same time, there would be a significant loss in the north of the site due to the loss of woodland habitats during improvements to the North Terminal roundabout. The improvements would result in the loss of areas of broadleaved plantation woodland to the south. This habitat is suitable for breeding bird species including dunnock, which is an Amber listed species, and mistle thrush and song thrush, which are Red listed species.

9.9.83 The works due to be undertaken from 2026 would result in the loss of a range of habitats suitable for breeding birds across the Project site.

9.9.84 Woodland, broadleaved tree and shrub planting would be undertaken early in the Project to compensate for the loss. However, there would be a long-term loss of these habitats due to the amount of time it would take for the new planting to reach maturity, particularly woodland. These

areas are likely to be used by a variety of bird species for foraging and nesting, however it is likely that birds displaced from these areas would move to nearby suitable habitat.

9.9.85 Additional mitigation measures would include retaining a 15 metre buffer around areas of ancient woodland, which would limit the levels of disturbance on birds using these areas.

9.9.86 Mitigation measures would be put in place to ensure birds and their nests were not harmed by the clearance of vegetation or by other demolition and construction works.

9.9.87 Overall, the mitigation measures would ensure that areas of suitable foraging and nesting habitat are replaced across the Project site and birds displaced from areas of construction would be likely to move to similar areas of suitable habitat within and adjacent to the Project site boundary. However, the time it would take for new planting to establish as a habitat of equal value would result in a long-term loss and a reduction in habitat connectivity. Nonetheless, this would not result in the complete loss of breeding sites and substantial areas of habitat would be retained within the Project site and within the vicinity.

9.9.88 The loss would result in a long-term, medium impact on other breeding birds (a feature of County value) due to the amount of time habitats would be absent, resulting in a **moderate adverse** effect. In the long-term, there would be a gain in the amount of habitat available which would have a low beneficial impact resulting in a **minor beneficial** effect.

9.9.89 An increase in noise due to construction works is considered unlikely to increase the significance of the effects reported above. The birds in the area are already habituated to high levels of noise from both aeroplanes and traffic.

Wintering Bird Assemblage (including BoCC Red or Amber listed species)

9.9.90 The works due to be undertaken between 2024 and 2029 would result in the loss or disturbance of habitats suitable for wintering birds, principally around the periphery of the Project site.

9.9.91 During surveys undertaken in 2018 and 2019, there were no wintering bird species recorded in any numbers that were considered to be of national or international significance. The overall impacts from loss of foraging habitat on a receptor of local value during construction between 2024 and 2029 within the Project site boundary would be low and medium term, resulting in a **minor adverse** effect.

Grass Snake

9.9.92 Two populations of grass snake were identified within the Project site boundary. The small population in the east of the site would not be affected by any construction activities during this phase of the Project. The larger population in the west of the site (NWZ) is associated with the wetland and grassland habitats along the corridor of the River Mole. The southern extent of this habitat would be temporarily lost due to the construction and use of the airfield satellite contactor compound (2024-2035) and the diversion of the River Mole corridor, the relocation of Pond A and the East of Museum Field flood compensation area (2024-2025).

9.9.93 A translocation exercise would be undertaken to move grass snake into existing retained habitat protected from construction areas or into newly-created and connected habitat within a mitigation area to the west prior to construction works affecting the existing habitat.

9.9.94 The completion of the Museum Field and east of Museum Field flood compensation areas and the creation of new habitats along the corridor of the diverted River Mole, would create new areas of habitat in the long-term thereby providing an increase in the amount of habitat available to grass snake in this area. Further areas of suitable habitat would then be created in 2035 when the airfield satellite contractor compound is decommissioned.

9.9.95 Due to the potential stress to individual snakes and risks associated with creating new habitats, the translocation could have a medium-term, low impact on the grass snake population present which is of local value, resulting in a **minor adverse** significance of effect.

Great Crested Newt

9.9.96 Two metapopulations of GCN were recorded within the Project site boundary. A small population was recorded in two closely located ponds in the north west of the site, west of the River Mole. The River Mole is considered a barrier to newt dispersal due to its steep sided channel and flowing water. Therefore, works within terrestrial habitats within 500 metres of the ponds but to the east of the River Mole would be unlikely to affect any GCN. This includes the Larkins Road diversion and the relocation of CARE Option 2/motor transport facilities/ Rendezvous Point North. The majority of the work proposed within this area would be within areas of existing hardstanding which provides unsuitable habitat for GCN further reducing the risk of effect. No work is currently proposed on the western side of the River Mole within 500 metres of the ponds.

9.9.97 New pond creation would create suitable breeding sites for GCN within a mitigation area in the west of the Project site providing opportunities for the existing metapopulation to extend in size and into new areas of the Project site thereby creating a more stable population less likely to be affected by any (non-Project related) effects. This would have a medium, long-term beneficial impact on a receptor of local value resulting in a **minor beneficial** effect.

9.9.98 A medium population of GCN was recorded in two closely located ponds in the east of the site within woodland near to Crawley Sewage Treatment Works. The proposed car park within Pentagon Field and flood storage areas in the LERL would affect suitable GCN terrestrial habitat comprising grassland within 500 metres of the ponds.

9.9.99 A GCN mitigation strategy would be devised and works would be undertaken under a Natural England mitigation licence to ensure no GCN were harmed or disturbed by the works.

9.9.100 Due to the distance of the affected habitats from the ponds, the risk of GCN being encountered is expected to be low. The grassland that would be lost is unlikely to form a core area of GCN terrestrial habitat (it is anticipated that the woodlands surrounding the ponds perform this function). Therefore, the medium-term impacts would be low and the effects on the GCN population of local value would be **negligible**.

Common Toad

9.9.101 The construction phase would result in the reduction in size of suitable terrestrial habitat for common toads when the airfield satellite contractor compound is constructed/in use, the River Mole corridor and Pond A are relocated, and East of Museum Field flood compensation area is constructed. Although there would be a reduction in the size of suitable habitat present, a significant habitat resource would remain within the local area to sustain the population present. Upon completion of the works in 2025 there would start to be an increase in the amount and value of suitable habitat present within these work areas as the new habitats establish. This

would result in a long-term, low impact on a receptor of local value as favourable habitats would be restored and extended upon construction completion. This would result in a **negligible** effect.

Badger

9.9.102 A main badger sett would be closed to allow the Project to be constructed and an artificial sett would be created within the badger social group's territory. The sett would be closed using appropriate methods and timings.

9.9.103 Further surveys would be required pre-construction to better understand the size and location of the badger territory and to identify other setts within it.

9.9.104 Although the closure of the sett would be undertaken under licence from Natural England, the closure of the main sett would result in a medium-term, low impact on the badger clan which is of local value, resulting in a **minor adverse** effect.

9.9.105 The increase in construction traffic and associated movements in areas around setts on site would mean that there would be the potential for a corresponding increase in road mortality for badgers using the site. However, it is not expected that badger movement (principally at night) and construction would overlap significantly. There would be construction undertaken at night on the airfield, but this is not considered to be an area well used by badgers. There is also the risk of badgers accessing construction areas. The mitigation measures designed into the Project would be implemented to ensure that no badgers were harmed during the construction phase.

9.9.106 Implementation of these best-practice measures would ensure that any impact on the badger population, which is of local value, during construction would be negligible. This would result in a **negligible** effect.

Otter

9.9.107 No signs of otters have been confirmed within the Project site boundary, but they are known to be present within the wider area and there is potential for them to utilise the River Mole. The river corridor would be monitored regularly prior to, and during the diversion of the river and the construction of the new channel connecting to the Museum Field and East of Museum Field flood compensation areas, to detect any otter presence and to inform whether mitigation was required.

9.9.108 Implementation of best-practice methods for pollution prevention (to be secured via the CoCP) would ensure that all impacts to and effects on otters, should they be present in the wider catchments, would be negligible. This would give rise to **a negligible** effect to a receptor of local value.

Bat Assemblage

9.9.109 The works due to be undertaken between 2024 and 2029 would result in the loss of a range of habitats suitable for foraging, commuting and roosting bats across the Project site.

9.9.110 Sections of broadleaved woodland and an area of marshy grassland would be lost due to the diversion of the River Mole corridor and the siting of the airfield satellite contractor compound south of Brockley Wood. The levels of bat activity recorded in the south of Brockley Wood were very high (a total of 41,710 bat passes) compared to other areas of the site, including the next nearest static survey location, which recorded 3,886 bat passes on land west of the River Mole (approximately 250 metres from Brockley Wood).

9.9.111 The Project has the potential to significantly reduce levels of bat activity in this area, but mitigation measures designed into the Project seek to reduce this potential impact. A 15 metre buffer between Brockley Wood and the construction compound/river diversion would ensure the high value habitats associated with Brockley Wood are protected. It would also retain a strip of habitat comprising woodland edge, scrub and grassland, which would aid in maintaining connectivity into the wider landscape from the south of Brockley Wood.

9.9.112 Overall, the works could result in a slight reduction in foraging habitat for the bat assemblage within this area due to the loss of marshy grassland; the higher value habitats in Brockley Wood would be retained and large areas of high value habitat would remain present within connecting areas along the Mole corridor (NWZ) to the west and north west of Brockley Wood. Therefore, there would not be a total loss of foraging habitat but there would be a long-term, low reduction until the new river corridor had been diverted and new habitats had established within it. In the longer term, this would result in higher value habitat than that present originally.

9.9.113 The airfield satellite construction compound would remain present until 2035 resulting in a continued reduction in grassland habitat. The compound would be designed to ensure no artificial lighting reached the woodland or the buffer around it. During construction and use of the compound, dust suppression measures would be used to prevent air borne dust from affecting the woodland.

9.9.114 The Project is considered unlikely to significantly affect habitat connectivity, as the area of high value habitat to the south of Brockley Wood is small and beyond it lie the lower value habitats associated with the airfield. A low number of bats were recorded commuting over the airfield, and it is likely that those bats would not be deterred by the presence of the compound. Brockley Wood would remain well connected to the River Mole and higher value habitats to the north and west.

9.9.115 The River Mole diversion and airfield satellite contractor compound would therefore result in the temporary, long-term loss of habitat in close proximity to Brockley Wood until the River Mole had been diverted and the compound was no longer required.

9.9.116 The works could therefore slightly reduce the amount of bat activity recorded in Brockley Wood due to the loss of habitat immediately south of it but as this loss is relatively small in the context of the wider landscape, and because habitat connectivity to the north and west is considered to be more important than to the south, the impact is considered to be no more than medium. The creation of the new river corridor would create new habitat of value to bats early in the Project period thereby minimising the effect.

9.9.117 The relocation of the fire training ground and new taxiways to the south of it would result in the loss of small areas of scrub and Pond A, which may be of some value to foraging bats but are considered to be lower value habitats. Their loss is therefore considered unlikely to significantly increase the effects on the bat assemblage present.

9.9.118 Habitat loss associated with the construction work in these areas would be compensated through planting hedgerows, scattered broadleaved trees and broadleaved woodland and creating neutral grassland throughout the mitigation area to the west of the Mole corridor (NWZ) to strengthen connectivity and the value of the habitats in that area. Although there would be a temporary, long-term loss until new planting has established, the mitigation would reduce the duration of the adverse impact of habitat loss compared to restoring the compound site upon the completion of works in 2035. The mitigation would also provide an enhancement due to new, higher value

habitats being present and improved habitat connectivity to the west in addition to the restored river corridor once the River Mole had been diverted.

9.9.119 The creation of the Museum Field and East of Museum Field flood compensation areas would also enhance the habitat suitability for foraging bats compared to the existing habitat and would also be well connected to the River Mole corridor.

9.9.120 Additional areas of semi-natural broadleaved woodland and broadleaved trees, along with areas of grassland would be lost in areas sited for new and replacement parking (including Pentagon Field and replacement Purple Parking at Crawter's Field), car parking and a hotel at existing Car Park H, Museum Field and East of Museum Field flood compensation areas and the construction of the noise mitigation feature. The loss would be small in comparison to the overall larger woodland areas. However, their absence would have a small adverse impact on the bat assemblage using these areas for foraging and commuting between sites.

9.9.121 New decked parking at Pentagon Field would introduce artificial lighting to an area that is currently unlit. There would be an increased risk of artificial light spill onto the habitats within the woodland buffers and the woodland at the height of the new deck. This would be mitigated for through the design of an appropriate lighting scheme that directs lighting into the car park and limits light spill onto the surrounding area.

9.9.122 The construction of the North Terminal Long Stay decked car park, relocated CARE facility/replacement motor transport facility/relocation of Rendezvous Point North would result in the loss of some small areas of woody vegetation where treelines and scrub form linear features within areas of hardstanding. The relatively low value of these areas to bats for foraging and commuting, due to the dominance of hardstanding, means their loss would have a low impact on the bat assemblage present.

9.9.123 The implementation of suitable mitigation measures would ensure that any impact due to habitat loss to the south of Brockley Wood, and habitat loss resulting from the other works areas described above, on the bat assemblage within this part of the site, which is of local value, would be no more than a long-term medium impact. This would result in a **minor adverse** effect.

9.9.124 The siting of the South Terminal surface access satellite contractor compound in the north east of the Project site would result in the loss of a small amount of broadleaved plantation woodland, which is suitable habitat for foraging and commuting bats.

9.9.125 There would be a gap approximately 10 metres wide in the existing near continuous linear strip of woody vegetation during the period 2024 to 2029. There are existing gaps of a similar or larger size where the B2036 and the mainline railway cross and therefore a new gap is considered unlikely to significantly deter bats foraging and commuting in this area from crossing it. Surveys completed during the latter half of 2020 suggest this area is not used by significant numbers of bats. However, an assessment will be provided in the ES once surveys are completed in 2021.

9.9.126 In 2029, the improvements to the South Terminal roundabout would result in the loss of a large amount of broadleaved plantation woodland to the north and south of the roundabout and road, plus sections of species-poor hedgerow with trees, which are suitable for foraging and commuting bats. Replacement native, broadleaved woodland and hedgerow planting would be undertaken upon completion of the highway improvements to compensate for this loss. However, it would take time for any planting to establish. Surveys completed during the latter half of 2020 suggest

this area is not used by significant numbers of bats. However, a full assessment will be provided in the ES once surveys are completed in 2021.

9.9.127 The improvements to the North Terminal roundabout would result in the direct loss of a small amount of semi-natural broadleaved woodland along the A23 adjacent to the southern boundary of Riverside Garden Park and the loss of a large area of broadleaved plantation woodland to the south of the road. This would result in a reduction in foraging habitat for bats and reduced habitat connectivity from east to west and from north to south through widening the size of the gap between the northern and southern sides of the road, which could affect commuting behaviour.

9.9.128 The majority of the woodland to the north of the new road alignment would be retained. This would ensure a substantial amount of the existing woodland remains present within Riverside Garden Park and that the area along the Gatwick Stream, where the highest levels of bat activity were recorded, would be least affected.

9.9.129 This would also maintain habitat connectivity from east to west through Riverside Garden Park although it could be reduced to the south due to the loss of plantation woodland.

9.9.130 This would be in addition to the habitat connectivity that would be lost to the east due to vegetation clearance associated with improvements to the South Terminal roundabout.

9.9.131 The mitigation measures designed into the Project to protect retained woodland and recreate woodland once the new highway alignment is complete would ensure the effects would be temporary. However, they would be long-term due to the time it would take for new habitats to establish and mature.

9.9.132 Surveys partially completed in this area during 2020, including crossing point work, found that the habitat around the River Mole corridor is the most sensitive for bats, with the highest levels of activity. These surveys will be completed in 2021 and an assessment of effects made in the ES.

9.9.133 However, due to the amount of time needed for new woodland to establish sufficiently to compensate for the loss, it is likely that the combined effect of the loss of woodland, hedgerow and scrub along both sides of the A23 London Road would result in a long-term, high magnitude impact on a receptor of local value resulting in a **moderate adverse** significance of effect.

9.9.134 Once new woodland has established, this would represent new foraging habitat and connectivity would be restored, which would result in a long-term, **negligible** impact resulting in a **negligible** significance of effect.

9.9.135 The remainder of the pre-construction activities undertaken between 2024-2029 would not result in an adverse impact on the bat assemblage present, above those which have already been identified.

Bat Assemblage – Bechstein's Bat and Barbastelle

9.9.136 The radio-tracking surveys identified that Museum Field (and surrounding area), the adjacent River Mole corridor (NWZ) and Brockley Wood were used as core foraging areas for multiple Bechstein's bats. During bat activity surveys, barbastelle bats were recorded in the southern section of Brockley Wood and in woodland to the west of the fire training ground. Bechstein's bats were also recorded flying over the runway in the west of the Project site.

9.9.137 Construction works in these areas would impact on the bats foraging and commuting in this area through habitat loss and disturbance. The diversion of the River Mole and the airfield satellite contractor compound would reduce habitat suitability and connectivity to the south of Brockley Wood. However, mitigation measures to protect the wood and maintain a 15 metre buffer along it would ensure bats could continue to commute into the wider landscape, including to the south. The completion of the River Mole diversion in 2025 would result in high value habitat establishing. Further grassland habitat would be created resulting in an enhancement to the habitat availability south of Brockley Wood.

9.9.138 The Museum Field flood compensation area would be constructed within the existing field and would not disturb the boundary woodland and trees, other than a small channel connecting it to the east. Therefore, the habitats utilised by bats in this area would be retained, reducing any impact construction works would have on the Bechstein's bat population.

9.9.139 Through the construction and operation of alterations to Taxiway Juliet and associated spur, there is a greater risk of bat mortality due to collision with aeroplanes and associated turbulence. However, the new spur would not be in constant use and aeroplanes using it would not be travelling at speed, therefore increased exposure to the risk of collision would be intermittent and not constant.

9.9.140 The mitigation and enhancement measures to the west of Brockley Wood would significantly improve the value of this habitat for bats by improving connectivity between roosting and foraging areas. This would be particularly beneficial for the Bechstein's bat populations to the west of the Project site. Although there would be a temporary, long-term loss until new planting has established, the mitigation would also reduce the scale and intensity of impacts on bat populations as a result of temporary habitat severance.

9.9.141 The activities associated with the construction of new and replacement car parks, the reconfiguration of airport facilities and noise mitigation features would be likely to have an adverse impact on Bechstein's bats through the removal of small areas of broadleaved woodland and broadleaved trees. Bechstein's bats were recorded along the southern boundary of the Project site and a roost was also recorded in Crawter's Wood. The roost would not be directly affected but bats using it could be affected by the small loss of woodland nearby.

9.9.142 Barbastelles were recorded in low numbers using habitats in the west of the Project site, near to the existing fire training ground and on the western edge of Crawter's Field. The additional Purple Parling at Crawter's Field would reduce the amount of foraging habitat in this part of the Project site but the retention of a woodland strip and additional habitat creation to the east would ensure habitat connectivity is retained.

9.9.143 The construction activities in the east of the Project site associated with new car parking have the potential to impact on Bechstein's bat and barbastelle, particularly as Bechstein's bat have been recorded foraging and roosting in Upper Pickett's Wood, Lower Pickett's Wood, Horleyland Wood and the surrounding landscape, which also recorded high activity levels from other bat species.

9.9.144 The loss of small areas of broadleaved woodland and trees from these areas would be compensated for in the overall planting strategy for the sites and new lighting regimes would be designed to prevent light spill onto adjacent higher value habitats.

9.9.145 As discussed in the section above, woodland planting would be undertaken early in the Project programme to compensate for the loss of suitable habitat, and therefore the impact on Bechstein's bat and barbastelle in these areas is likely to be temporary and localised within areas of less suitable habitat, compared to those found in the north west of the Project site and within the wider landscape. Additionally, mitigation measures designed into the Project would ensure a 15 metre buffer is retained and protected along the boundary of Lower Picketts Wood and the woodland within Pentagon Field to protect it.

9.9.146 A substantial amount of habitat loss would occur from the construction of the South Terminal surface access satellite contractor compound and South Terminal improvement works. Bechstein's bats were not recorded using these areas during radio-tracking surveys in 2019, however it is possible that they would utilise the habitat along the M23 for commuting to other foraging and roosting habitat within the wider area, as the woodland forms an east-west habitat corridor along the northern and southern boundaries of the existing South Terminal roundabout, M23 and Airport Way. Further surveys will be undertaken to determine the use of these areas by Bechstein's bat and barbastelle and will be reported in the ES.

9.9.147 A Bechstein's bat was recorded using habitats within Riverside Garden Park. The majority of the habitats in the park would be retained with the exception of a narrow strip where it borders the A23 road to the south which would be lost to the North Terminal roundabout improvements. The home range of the bat was found to also include habitats in the west of the Project site along the River Mole. The loss of habitat as a result of the improvement works would reduce habitat connectivity between these two areas due to the loss of woodland habitats between them. Bechstein's bats have been recorded crossing large areas of lower suitability habitats within the Project site and therefore bats may continue to cross this area but there is potential for them to be deterred by the large open space and lack of vegetation cover.

9.9.148 The North Terminal roundabout improvements have been designed to retain woodland vegetation along the Gatwick Stream, which would ensure a dark, well vegetated corridor would be retained connected to the River Mole corridor (NWZ). This would ensure that a suitable foraging and commuting route would be retained between the two areas.

9.9.149 In the long-term, new woodland planting along the new road alignment would create new areas of foraging habitat for Bechstein's bats and restore habitat connectivity to a level similar to that currently present. The area of woodland due to be lost is considered to be of lower value to Bechstein's bats compared to the habitats in the east and west of the site, which would be retained and enhanced. Due to the time it would take for new habitats to establish and mature, there would be a long-term, low impact on the Bechstein's bat population present.

9.9.150 Given that very low numbers of barbastelles were recorded, the Project site is considered unlikely to provide a key area of habitat for the local population. The medium to long-term loss of foraging habitat would be relatively small given the amount of suitable habitat within the wider area. The new habitat creation proposed in the west of the Project site would provide a larger area of higher value habitat than that due to be lost.

9.9.151 The remainder of the activities undertaken between 2024-2029 would not result in an adverse impact on Bechstein's bat or barbastelle, above those which have already been identified. With the mitigation measures proposed, the long-term impacts on Bechstein's bat and barbastelle, which are of county value, would be low resulting in a **minor adverse** effect.

Harvest Mouse

9.9.152 Harvest mouse has been recorded within the drier grassland associated with the River Mole corridor (NWZ). Parts of the suitable habitat for harvest mouse would be affected by the Project temporarily during the construction phase but the majority of areas would be retained. Post construction, suitable habitats would be restored and new habitats would be created.

9.9.153 This would result in a medium-term, low impact to a receptor of local value followed by a long-term, low beneficial impact due to the creation of new habitats resulting in a **negligible** effect.

Hedgehog

9.9.154 Hedgehog has been recorded within the Project site boundary. Areas of suitable habitat for hedgehog would be affected by the Project temporarily and permanently during the construction phase, including woodland, grassland and hedgerows, but further areas would be retained. Post construction, areas of suitable habitats would be restored.

9.9.155 This would result in a medium-term, low impact to a receptor of local value resulting in a **minor adverse** effect.

Terrestrial Invertebrate Assemblage

9.9.156 The key areas of the Project site with respect to terrestrial invertebrates include the two Gatwick biodiversity areas – the LERL and NWZ. Other incidental areas of higher value (including the bunding around the Fire Training Area and Pentagon Field) are also present. The scheme has been designed to retain the areas of highest value for terrestrial invertebrates, including the bunding to the south of Brockley Wood and edge habitat around Pentagon Field.

9.9.157 Both of the biodiversity areas would be affected by flood compensation works during the construction phase with the temporary loss of areas of semi-improved grassland. Other areas of habitat loss (mainly grassland but also areas of scrub) will occur within Pentagon Field to allow the construction of new car parking and alterations on the airfield to the existing Northern Runway and reconfiguration of the taxiways.

9.9.158 The land in the LERL will be re-instated post construction while the creation of the River Mole diversion will provide an overall increase in habitat of value to invertebrates.

9.9.159 This habitat loss would result in a medium-term, medium adverse impact to a receptor of county value resulting in a **moderate adverse** effect. This would be followed by a long-term, low beneficial impact due to the creation of new habitats resulting in a **minor beneficial** effect.

Shining Ramshorn Snail

9.9.160 Although not located during the surveys, records of this species from the River Mole have been recorded for the area around Gatwick. Therefore, it is possible it may be present. Works to realign the River Mole will be undertaken offline from the existing water course while the areas of flood compensation to be created between the river and the Museum Field will result in temporary loss of habitat for this species. Decreases in water quality due to pollution from fuel spillages or changes in sedimentation will be managed during the construction phase, as set out in the CoCP.

9.9.161 The habitat loss associated with the construction works will be followed by an overall increase in the area of habitat available for this species with the alterations to the course of the River Mole increasing the length of habitat available.

9.9.162 This habitat loss would result in a medium-term, low adverse impact to a receptor of local value resulting in a **minor adverse** effect. This would be followed by a long-term, low beneficial impact due to the creation of Mole diversion resulting in a **negligible** effect.

Fish

9.9.163 Both the Gatwick Stream and River Mole were found to support good populations of fish. Other than a small area of bank lowering to connect the new flood compensation land to the watercourse, no direct works to the Gatwick Stream are proposed and it is anticipated that works on the diversion of the Mole would be undertaken offline to minimise any impact to the river, including fish. Decreases in water quality due to pollution from fuel spillages or changes in sedimentation will be managed during the construction phase, as set out in the CoCP.

9.9.164 Once created, the diverted Mole is expected to have improved flow characteristics and associated higher oxygen levels. As such, the impact of the new habitat creation during the construction phase on fish is expected to be long-term, low beneficial resulting in a **negligible** effect.

Further Mitigation

9.9.165 The assessment is based on the maximum design scenario and, as such, assumes all habitats would be lost within the boundary of each development plot except where specific planting plans form part of the current design.

9.9.166 The maximum construction area required for the highways will be reviewed further throughout the EIA and design process, with a view to minimising this loss and retaining a linear strip of trees and shrubs to help retain habitat connectivity where practicable. Should this not be possible, opportunities to undertake additional tree and shrub planting would be sought prior to highways work commencing, to create a new east to west green corridor in the north of the site that connects to retained habitats.

Future Monitoring

9.9.167 Monitoring for bats, badgers, GCN and reptiles would be required during the construction phase, after species have been translocated and new habitats created.

9.9.168 Monitoring for otters and badgers would be required prior to and during construction.

Significance of Effects

9.9.169 The proposed monitoring would be undertaken as part of the Project; therefore, the significance of effects would remain as presented above.

2030-2032

9.9.170 The northern runway would be operational in 2029 and construction activities would continue during the period 2030 to 2032. This would include the further reconfiguration of taxiways, stands and other airport facilities, the extension of terminals and internal access alterations within the airport boundary. The habitats within these areas are predominantly low value and most potential

impacts on habitats or species would have already occurred in the period 2024 to 2029 and are assessed in the section above. Any potential effects from works undertaken during this period are considered in this section.

9.9.171 Works to the Longbridge roundabout and the construction of the Longbridge roundabout satellite contractor compound would commence during this period and the potential effects on ecology are discussed in this section. The construction of the North and South Terminal roundabout improvements would continue through this period and compounds for both roundabouts would continue to be operational. Vegetation clearance would have occurred in 2029 and the effects of habitat loss are assessed in the previous section.

9.9.172 Works comprising the construction of car parks, offices and hotels at Car Parks H and Y and North Terminal Long Stay decked car park would continue between 2030 and 2032. Any habitat clearance from these areas would have already been undertaken in the period 2024 to 2029 and is assessed in the section above. However, there is potential for further effects from the ongoing construction works which are assessed in this section.

Statutory Designated Sites

9.9.173 Due to the distance of the statutory designated sites from the Project site boundary, and the mitigation measures designed into the Project to ensure possible pollutants are prevented from reaching them, the construction of the Project would continue to have no impact on statutory designated sites. There would be no effect due to loss or alteration to the habitats or species present. The magnitude of impact and significance of effect would be **no change**.

9.9.174 The altered northern runway would be fully operational by 2029, resulting in an increase in flights and an increase in vehicles accessing the airport during this assessment period. This in turn would increase airborne emissions.

9.9.175 Changes to air quality arising from emissions can impact habitats and the animals/plants they support through direct toxicity and through indirect effects such as eutrophication of the soil and associated changes in species composition. Operational emissions have been modelled following standard good practice guidelines at a selection of discrete receptor points at the closest point of the statutory designated sites within 5 km of the Project (see Chapter 13: Air Quality and associated appendices for full details and results).

9.9.176 For the 2032 interim assessment year, the predicted nitrogen oxides (NO_x) concentration is below the critical level set for vegetation (30 $\mu g.m^{-3}$) both without and with the Project at all modelled points around the statutory designated sites. On this basis, therefore, no changes due to air quality to receptors of national value are predicted. The magnitude of impacts and significance of effects would be no change.

9.9.177 Changes to air quality at sites beyond the 5 km buffer around the Project site may occur through emissions from increased vehicle movements associated with surface access to the airport. Such sites are of international value and include the SPAs and SACs described in Table 9.6.5. Modelling of emissions has been undertaken, based on the strategic traffic model created for the Project, with an interim assessment year of 2032 (see Chapters 13 Air Quality and 12 Traffic and Transport, and associated appendices for details).

9.9.178 For all sites considered, either the difference between the future baseline and 'with Project' scenario (the 'do nothing' and the 'do something' scenarios) is less than 1% of the relevant critical

load/level, or the total concentration/deposition does not exceed the relevant critical load/level. Where this is not the case, the only exceedances of 1% of the critical load/level are directly adjacent to the road within the road verge. None of the sites assessed have habitats or interest features that extend to the road verge. On this basis, therefore, no changes due to air quality to receptors of international value are predicted. The magnitude of impacts and significance of effects would be no change.

9.9.179 Full details of the assessment are provided in Appendix 9.9.1 Habitats Regulations Assessment Report.

Non-statutory Designated Sites

9.9.180 Horleyland Wood LWS is the nearest non-statutory site to works areas within the Project boundary but the works in closest proximity to it would have been undertaken prior to 2030.

9.9.181 The remaining non-statutory designated sites are more than 600 metres from the Project site boundary and therefore less sensitive to effects from construction.

9.9.182 Mitigation measures designed into the Project, including ensuring possible pollutants are prevented from reaching the non-statutory designated sites, would ensure the Project would have no impact upon them. There would be no effect due to loss or alteration to the habitats or species present. The magnitude of impact and significance of effect would be **no change**.

9.9.183 Further details of the effects of air quality on non-statutory designated sites will be provided in the ES.

Ancient Woodland

9.9.184 No new construction activities would start in close proximity to ancient woodlands in the period 2030 to 2032. The minimum 15 metre buffer would remain in place around Brockley Wood whilst the airfield satellite contractor compound remains operational through this period.

9.9.185 Mitigation measures designed into the Project to ensure that possible pollutants are prevented from reaching Brockley Wood would ensure the Project would have no impact upon it. This would result in no change to a receptor of regional value. The magnitude of impact and significance of effect would be **no change**.

9.9.186 An assessment of the effects of air quality on ancient woodland has been undertaken. For all areas of ancient woodland considered, either the difference between the ‘do nothing’ and the ‘do something’ scenarios is less than 1% of the relevant critical load/level, or the total concentration/deposition does not exceed the relevant critical load/level. Further details regarding air quality emissions are provided in Chapter 13: Air Quality and associated appendices.

9.9.187 This would result in no change to a receptor of regional value. The magnitude of impact and significance of effect would be **no change**.

Habitats

Semi-natural Broadleaved Woodland and Broadleaved Trees

9.9.188 Areas of semi-natural broadleaved woodland and individual broadleaved trees would be lost due to the construction of the Longbridge roundabout satellite contractor compound in 2030 and the start of works to the Longbridge roundabout in 2031. The largest area of woodland would be lost

to the east of the roundabout and bordering the River Mole and a small area of woodland would be lost to the south of the A23, also bordering the River Mole.

9.9.189 A small, approximately 10 metre wide, gap would initially be created in a line of trees to the north-east of the roundabout to provide access to the compound. The assessment assumes at this stage that the commencement of the roundabout works in 2031 would result in the loss of all trees within the Project site boundary to the north of the roundabout and along the A23 Brighton Road to the north-east. Broadleaved trees would also be lost from the area west of the roundabout and from on the roundabout.

9.9.190 As well as the direct loss of habitat, the loss of woodland and trees would result in a loss of habitat connectivity reducing the ability of flora and fauna to disperse across the landscape. This area connects to the North Terminal roundabout improvements works area to the east where a substantial amount of broadleaved plantation woodland and some semi-natural broadleaved woodland would have already been lost (prior to 2030). The Longbridge roundabout improvements would therefore further the extent of woody habitat loss and extend the loss in habitat connectivity.

9.9.191 Replacement native tree and shrub planting would be undertaken in late 2032 to compensate for the loss of habitat and to re-connect the severed habitat. Due to the lack of vegetation during the construction period and the time it would take new planting to establish, there would be a long-term loss of habitat and connectivity.

9.9.192 When the Longbridge roundabout improvements are considered in combination with the North and South Terminal roundabout improvements, the loss of woodland and trees would add to the long term, medium impact on a habitat of County importance previously assessed for the period 2024 to 2029. It would not result in any change to the **moderate adverse** significance of effect already determined.

Hedgerows

9.9.193 An intact species-poor hedgerow would be lost to construct Pier 7. To compensate for the loss of the hedgerow, new hedgerow would be planted along access roads in close proximity. This would replace the habitat lost and help retain habitat connectivity. The new hedgerow would be planted in advance of the existing hedgerow being lost.

9.9.194 Therefore, there would be a medium-term loss of hedgerow followed by a long-term increase in the length of hedgerow in this part of the site. This would result in an overall negligible impact on a hedgerow of County value resulting in a **negligible** effect.

Watercourses

9.9.195 Best practice measures to mitigate the ongoing construction impacts would continue to control the impacts on surface water resulting in no significant effects, as reported in Chapter 11: Water Environment.

9.9.196 Pollution control measures would limit any impacts during the improvements to the North and South Terminal roundabouts and the works to Longbridge roundabout. The surface water assessment in Chapter 11: Water Environment of this PEIR identifies that the roadworks would have impacts during construction, including increased suspended sediment concentrations and potential change to water quality. However, the overall effect would be negligible/minor adverse.

The impact on the ecology of the watercourse would therefore be negligible for the medium-term and would result in a **negligible** effect to a receptor of County value.

Ponds (NERC S.41 Habitat)

9.9.197 No ponds qualifying as a NERC S.41 Habitat would be directly impacted by the Project. Measures to protect habitats of value designed into the Project, including pollution prevention measures and the erection of study fencing around higher value habitats would ensure that no adverse effects occur. The magnitude of impact and significance of effect would be **no change**.

Ponds (not NERC S.41 Habitat)

9.9.198 Pond D would be affected by an increase of surface water draining into it. Pond D was found to be of low ecological value and therefore an increase in surface water would have a negligible impact on its ecology value. This long-term, negligible impact on a receptor of local value would result in a **negligible** effect.

9.9.199 A newly-created pond in the west of the site would be establishing and beginning to support a range of flora and fauna by 2030. This would increase the number and distribution of ponds within the Project site boundary and provide new and additional habitat for a range of flora and fauna. This would have a long-term, low beneficial impact to a receptor of local value resulting in a **minor beneficial** effect.

Semi-improved Neutral Grassland

9.9.200 No areas of semi-improved neutral grassland would be impacted by construction works undertaken during this phase of the Project. The magnitude of impact and significance of effect would be **no change**.

Marshy Grassland

9.9.201 No areas of marshy grassland would be impacted by construction works undertaken during this phase of the Project.

9.9.202 A new area of marshy grassland would already have been created in the west of the site, along the River Mole diversion and within the Museum Field and East of Museum Field Flood Compensation areas and would be establishing. This was previously assessed as having a long-term medium beneficial impact, resulting in a **minor beneficial** significance of effect.

9.9.203 However, any delays in the establishment of marshy grassland would result in a continued medium-term, low negative impact on a receptor of local value which would result in a **minor adverse** effect.

Broadleaved Plantation Woodland and Associated Scrub

9.9.204 No areas of broadleaved plantation woodland would be impacted by construction works undertaken during this phase of the Project. The magnitude of impact and significance of effect would be **no change.**

Flora: Bluebell and Pennyroyal

9.9.205 Relatively small areas of woodland would be affected given the overall resource within the Project site boundary. Mitigation measures to protect bluebell by collecting bulbs during the clearance of

woodland and replanting them within woodland planted in the mitigation area would ensure the long-term impact on bluebells, which are of local value, would be low. This would result in a **minor adverse** significance of effect.

9.9.206 The effects on pennyroyal as a result of improvements to the South Terminal roundabout are discussed in the above section for 2024 to 2029.

Flora: Lesser Quaking Grass, Narrow-lipped Helleborine, Ragged Robin and Solomon's Seal

9.9.207 No construction works are required within the locations where notable flora were identified. Measures to protect habitats of value from pollution events would ensure the plants were not affected. This would ensure there would be **no change** to the presence or distribution of the species due to the Project.

Breeding Birds (Annex 1 EU Birds Directive and/or listed under Schedule 1 of the WCA)

9.9.208 No Schedule 1 breeding birds were confirmed to be present and therefore no effects are currently foreseen. Further surveys will be undertaken to determine whether any Schedule 1 birds are breeding within the Project site boundary as a precaution prior to construction works commencing. Should Schedule 1 breeding birds be present, measures would be put in place to ensure they were not disturbed by any Project related work. This would include identifying appropriate buffers around the nest within which works that could lead to disturbance would be prohibited. The nests would also be closely monitored by suitably experienced ornithologists who would undertake dynamic risk assessments to ensure mitigation measures were altered to further reduce the risk of disturbance if necessary.

Breeding Birds (NERC Species of Principal Importance and BoCC Red or Amber listed species)

9.9.209 The works due to be undertaken from 2029 and beyond would result in the loss of habitats suitable for breeding birds across the Project site.

9.9.210 A hedgerow, which provides suitable habitat for breeding birds, would be lost as part of the construction of Pier 7. Prior to removal, and to compensate for the loss of the hedgerow, new hedgerow planting would be created along adjacent access roads, but this is unlikely to have established sufficiently to offer more than low value habitat. It is likely that birds utilising this hedgerow would be displaced to other areas of suitable habitat within the Project site boundary and therefore this would result in a low impact.

9.9.211 Works to Longbridge roundabout would result in the loss of a mature tree line, areas of semi-natural broadleaved woodland and scattered broadleaved trees. This would affect the breeding bird assemblage utilising this area and would account for a small additional loss of habitat in addition to the substantial habitat loss associated with improvements to the North and South Terminal roundabouts.

9.9.212 The works from 2030 to 2032 would result in an additional loss of suitable nesting sites for breeding birds in addition to the habitats lost between 2024 and 2029. New habitats would be establishing, and some would be at a stage suitable for supporting nesting birds within the wider Project site. However, there would continue to be an overall reduction in nesting sites for birds resulting in the continued medium-term, medium impact to a feature of County value resulting in a **moderate adverse** effect. In the long term, when new planting has fully established, there would be increased nesting opportunities resulting in a **minor beneficial** effect.

Wintering Bird Assemblage (including BoCC Red or Amber Listed Species)

9.9.213 The works due to be undertaken from 2030 to 2032 would predominantly be outside of the habitats identified as suitable for wintering birds across the Project site.

9.9.214 During surveys undertaken in 2018 and 2019, there were no wintering bird species recorded in any numbers which were considered to be of national or international significance. The overall long term impacts from loss of foraging habitat during construction from 2030 to 2032 within the Project site boundary would be negligible on a receptor of local value resulting in a **negligible** effect.

Grass Snake

9.9.215 Grass snake would not be affected by construction activities being undertaken at this stage of the Project. The magnitude of impact and significance of effect would be **no change**.

Great Crested Newt

9.9.216 Great crested newt would not be affected by construction activities being undertaken at this stage of the Project. The magnitude of impact and significance of effect would be **no change**.

Common Toad

9.9.217 The construction activities being undertaken at this stage of the Project would have a limited impact on habitats suitable for common toad and would be unlikely to have any impact on the overall population. The magnitude of impact and significance of effect would be **no change**.

Badger

9.9.218 A main badger sett would have been closed to allow earlier aspects of the Project to be constructed. An artificial sett would have been created within the badger social group's territory. Ongoing monitoring would have determined whether the badger social group had successfully moved to the artificial sett and any necessary remedial works would have been implemented.

9.9.219 New habitats would have been created around the artificial sett, increasing the foraging resource for badgers. By 2030, there would be no impacts on the new sett and habitat creation resulting in no effect on the badger sett.

9.9.220 The continued increase in construction traffic and associated movements in areas around setts on-site would mean that there would be the potential for a corresponding increase in road mortality for badgers using the site. However, it is not expected that badger movement (principally at night) and construction would overlap significantly. There is also the risk of badgers accessing construction areas. The mitigation measures designed into the Project would be implemented to ensure that no badgers were harmed during the construction phase.

9.9.221 There would be more operational traffic on the roads around the airport. However, the minor roads nearest to the setts which badgers are most likely to cross are unlikely to receive substantial increases in traffic. Impacts from increased traffic on more major roads at a greater distance from the setts are considered less likely as badgers would disperse within the wider area in lower numbers or less frequently.

9.9.222 The implementation of best-practice measures during construction would ensure that any impact on the badger population, which is of local value, during construction would be negligible. This would result in a **negligible** effect.

Otter

9.9.223 No signs of otter have been confirmed within the Project site boundary, but they are known to be present within the wider area and there is potential for them to utilise the River Mole and Gatwick Stream. The river corridors would be monitored regularly prior to and during the construction of the Longbridge roundabout satellite contractor compound and the Longbridge roundabout improvements to ascertain whether mitigation was required.

9.9.224 Implementation of best-practice methods for pollution prevention (to be secured via the CoCP) would ensure that such impacts and effects on otters, should they be present in the wider catchments, would be negligible.

9.9.225 An area of semi-natural broadleaved woodland would be cleared to the east of the roundabout which borders the River Mole. The loss of the woodland would result in less screening of the river channel and it becoming less secluded which could have an effect on otter behaviour resulting in them being deterred from crossing the open area, particularly when levels of disturbance were high from construction activities.

9.9.226 The compound would be located adjacent to the River Mole, which would also increase the risk of disturbance to otters from human activity and increased artificial lighting. Otters could be deterred from accessing part of their territory which could impact their availability to food and ability to breed.

9.9.227 However, given that otter have not been recorded within the Project site and that the section of river that would be affected would account for a small part of an otter's wider territory, the impact would be low. This would give rise to a **minor adverse** effect on a receptor of County value.

Assemblage of Bat Species

9.9.228 Works to Longbridge roundabout would result in the loss of a mature tree line north of the roundabout and an area of semi-natural broadleaved woodland east of the roundabout, which forms a continuation of the habitat corridor west of Riverside Garden Park and would therefore further reduce habitat connectivity and result in the loss of suitable foraging habitat. New planting would be undertaken in 2032 at the end of the works and at the same time as replacement planting around the North Terminal roundabout improvements but until it has matured there would be a long-term loss of foraging habitat and connectivity.

9.9.229 When considered in combination with the North and South Terminal roundabout improvements, the works to the Longbridge roundabout would result in a continued long-term, high impact on the bat assemblage, which is of local value, resulting in a continued **moderate adverse** effect until new planting is sufficiently mature to compensate for the loss of foraging and commuting habitat.

9.9.230 Once new planting has established and matured along all the highway improvement areas, the amount of available foraging habitat would be similar to current areas but of higher value. Habitat connectivity would be restored. The impact of the works would then be low and long-term resulting in a **minor beneficial** effect.

9.9.231 In the period 2030 to 2032, work would continue within Car Parks H and Y and in the North Terminal Long Stay decked car park. The vegetation within these areas would have already been cleared in the period 2024 to 2029 but works to construct decked parking, hotels and offices would continue into 2030 to 2032.

9.9.232 This would result in the potential for increased light spill onto retained habitats around the periphery of these locations and light spill from an increased height. Car Park Y and the North Terminal Long Stay decked car park border the higher value habitats for bats along the River Mole corridor and therefore there would be a risk of increased light spill onto the river corridor affecting bat activity. External lighting of car parks and hotels would be designed to prevent light spill from reaching the river corridor to mitigate this effect.

9.9.233 An intact species-poor hedgerow would be lost to construct Pier 7. To compensate for the loss of the hedgerow, new hedgerow would be planted along access roads in close proximity. This would replace the foraging habitat lost and help retain habitat connectivity for commuting bats. The new hedgerow would be planted in advance of the existing hedgerow being lost.

9.9.234 The hedgerow is within an area dominated by hardstanding associated with roads, car parking and the airfield so the overall value of the area for bats is considered to be relatively low.

9.9.235 This would result in a long-term, negligible impact on the bat assemblage resulting in a **negligible** significance of effect.

Bats (Bechstein's and Barbastelle Bats)

9.9.236 Bechstein's bat was recorded using habitats within Riverside Garden Park. The majority of the habitats in the park would be retained but the improvements to the Longbridge roundabout would result in the loss of semi-natural broadleaved woodland along the River Mole corridor to the west of the park. The home range of the bat was found to also include habitats in the west of the Project site along the River Mole. The loss of habitat as a result of the improvement works would reduce habitat connectivity between these two areas due to the loss of woodland habitats between them. Bechstein's bats have been recorded crossing large areas of lower suitability habitats within the Project site and therefore bats may continue to cross this area but there is potential for them to be deterred by the large open space and lack of vegetation cover.

9.9.237 In the long-term, new woodland planting along the new road alignment would create new areas of foraging habitat for Bechstein's bats and restore habitat connectivity to a level similar to that currently present. The area of woodland due to be lost is considered to be of lower value to Bechstein's bats compared to the habitats in the east and west of the site, which would be retained and enhanced.

9.9.238 Due to the time it would take for new habitats to establish and mature, there would be a long-term, low impact on the Bechstein's bat population present which is of County value, resulting in a **minor adverse** effect.

Harvest Mouse

9.9.239 In 2030, new areas of semi-improved neutral grassland would have been created within the mitigation area in the west of the site to compensate for the loss of habitat during construction and to create new areas of suitable habitat. The Project would therefore have a long-term low

beneficial impact on Harvest Mouse (a receptor of local value) resulting in a **minor beneficial** effect.

Hedgehog

9.9.240 Areas of the suitable habitat for hedgehog would be affected by the Project temporarily and permanently during the construction phase, including woodland, grassland and hedgerows, particularly habitats affected by the Longbridge roundabout improvements and Longbridge roundabout satellite compound. Some of the habitats lost in the earlier phase of construction work; associated with road improvements and construction of car parks and hotels, would yet to have been re-instated but further areas would be retained within the wider Project boundary. Post construction, areas of suitable habitats would be restored and new areas of suitable habitat would be established within the mitigation area in the west of the site.

9.9.241 In the long-term, there would be a low beneficial impact to a receptor of local value resulting in a **minor beneficial** effect.

Terrestrial Invertebrate Assemblage

9.9.242 By 2030, the new areas of flood compensation would have been created and would be establishing. No further works to areas that might support terrestrial invertebrate assemblages of conservation interest are proposed in this period. This would result in the same long-term, low beneficial impact and **minor beneficial** effect identified previously.

Shining Ramshorn Snail

9.9.243 By 2030, the new River Mole diversion would have been created and would be establishing. No further works to areas that might support this species are proposed in this period. On-going implementation of pollution and sediment control measures (described in the CoCP) would ensure water quality is maintained. This would result in the same long-term, low beneficial impact and **negligible** effect identified previously.

Fish

9.9.244 By 2030, the new River Mole diversion would have been created and would be establishing. No further works to areas that might support fish are proposed in this period. Ongoing implementation of pollution and sediment control measures (described in the CoCP) would ensure water quality is maintained. This would result in the same long-term, low beneficial impact and **negligible** effect identified previously.

Further Mitigation

9.9.245 The assessment is based on the maximum design scenario and, as such, assumes all habitats would be lost within the boundary of each development plot shown except where specific planting plans form part of the current design. The extensive loss of the existing habitats to allow the Longbridge highway improvements would have a significant effect due to the loss of woodland and scrub that would remove a green corridor and reduce habitat connectivity. This would also result in a significant loss of nesting sites for breeding birds and foraging and commuting routes for bats and otters.

9.9.246 The maximum construction area required for the highways will be reviewed throughout the EIA process, with a view to minimising this loss and retaining a linear strip of trees and shrubs to help

retain habitat connectivity where practicable. Should this not be possible, opportunities to undertake additional tree and shrub planting would be sought prior to highways work commencing, to create a new east to west green corridor in the north of the site that connects to retained habitats.

Future Monitoring

9.9.247 Monitoring for otters and badgers would be required prior to and during construction.

9.9.248 Continued monitoring of the populations of bats, GCN and grass snake would be required to determine the success of the mitigation implemented.

9.9.249 Monitoring of any habitat creation would also be required to determine its success and to inform whether any remediation works were required.

Significance of Effects

9.9.250 The proposed monitoring would be undertaken as part of the Project. Therefore, the significance of effects would remain as presented above.

2033-2038

Ongoing Construction Activities

9.9.251 In the period 2033 to 2038, construction activities would include phase 2 to Car Park Y and the creation of the Gatwick Stream flood compensation area. Any effects on ecology and nature conservation from the works in Car Park Y would have occurred in previous years and have already been assessed.

9.9.252 There would be no new effects from any construction activities that were started prior to 2033 but continue through this period that have not been assessed under the previous section of this chapter (2030-2032).

Statutory Designated Sites

9.9.253 Construction activities would continue in 2033. Due to the distance of the statutory designated sites from the Project site boundary, and the mitigation measures designed into the Project to ensure possible pollutants are prevented from reaching them, the construction of the Project would continue to have no impact on statutory designated sites. There would be no effect due to loss or alteration to the habitats or species present. The magnitude of impact and significance of effect would be **no change**.

9.9.254 Changes to air quality through emissions of various chemical species can impact habitats and the animals/plants they support through direct toxicity and through indirect effects such as eutrophication of the soil and associated changes in species composition. Operational emissions for 2038 will be modelled following standard good practice guidelines at a selection of discrete receptor points at the closest point of the statutory designated sites within 5 km of the Project to confirm the findings presented above for 2032 (which is anticipated to be the worst case effect). Results of this further confirmatory modelling will be presented in the ES.

Non-statutory Designated Sites

9.9.255 The Gatwick Stream flood compensation area would be located approximately 375 metres south of Horleyland Wood LWS. The Project would involve the excavation of existing ground levels to create flood attenuation basins.

9.9.256 The remaining non-statutory designated sites are more than 600 metres from the Project site boundary and therefore less sensitive to effects from construction.

9.9.257 Mitigation measures designed into the Project, including ensuring possible pollutants are prevented from reaching the non-statutory designated sites, would ensure the Project would have no impact upon them. There would be no effect due to loss or alteration to the habitats or species present. The magnitude of impact and significance of effect would be **no change**.

Ancient Woodland

9.9.258 The potential impacts and the measures to protect the ancient woodland in Horleyland Wood and Lower Picketts Wood are described above for non-statutory designated sites. These would ensure the creation of the flood compensation area to the east of Gatwick Stream would result in no impacts from contamination, most notably from dust.

9.9.259 The airfield satellite contractor compound would be operational until 2035, in close proximity to Brockley Wood.

9.9.260 Mitigation measures designed into the Project ensuring possible pollutants are prevented from reaching Brockley Wood would ensure the Project would have no impact upon it. This would result in **no change** to a receptor of regional value.

9.9.261 An assessment of the effects of air quality on ancient woodland will be included in the ES.

Habitats

Semi-natural Broadleaved Woodland and Mature Broadleaved Trees

9.9.262 No new areas of semi-natural broadleaved woodland or mature broadleaved trees would be affected by construction activities being undertaken at this stage of the Project. The trees around the margins of the Gatwick Stream flood compensation area would be protected throughout the construction period by standard tree protection measures. The magnitude of impact and significance of effect would be **no change**.

Hedgerows

9.9.263 No new hedgerows would be affected by construction activities being undertaken at this stage of the Project. The magnitude of impact and significance of effect would be **no change**.

Watercourses

9.9.264 A short section of the Gatwick Stream measuring approximately 55 metres long would be affected by the creation of a spillway along its eastern bank to connect it to the flood compensation area to the east of Gatwick Stream. This would result in the loss of the existing bank and the creation of a gentler slope. The slope would develop into wetland or grassland habitat of an equal value to the existing bankside habitat.

9.9.265 There would be a long-term loss of bankside habitat before new vegetation has established but this would affect a very short section of the stream and therefore the overall impact would be low. This would result in long-term, low impact to a receptor of County value resulting in a **minor adverse** significance of effect.

Broadleaved Plantation Woodland and Associated Scrub

9.9.266 An area of relatively young broadleaved plantation woodland would be lost during the construction of the Gatwick Stream flood compensation area due to the need to reduce existing ground levels by up to 3 metres. The woodland is located close to the stream corridor where the connection from the flood compensation area to the stream would be made. The creation of new areas of broadleaved woodland within the wider Project boundary would compensate for this loss.

9.9.267 There would be a long-term loss during construction and until new planting has reached the maturity of the trees that have been lost. There would be an overall, long-term, low loss in the amount of woodland, of local value, resulting in a **minor adverse** effect.

Semi-improved Neutral Grassland

9.9.268 Areas of semi-improved neutral grassland would be lost during the construction of the Gatwick Stream flood compensation area. There would be a long-term loss during construction with areas at the top of banks within the flood compensation area being returned to semi-improved neutral grassland upon completion. There would be an overall, long-term, small loss in the amount of semi-improved neutral grassland.

9.9.269 New areas of semi-improved neutral grassland would have been created within the flood compensation area and the mitigation area in the west of the site by this time. This would compensate for the loss of the semi-improved neutral grassland cleared for the flood compensation area to the east of Gatwick Stream. There would therefore be a negligible, long-term impact on this habitat of local value resulting in a **negligible** effect.

9.9.270 Any unforeseen delay in creating the grassland or failure in it establishing successfully resulting in the need for remedial works would delay the grassland reaching its desired outcome. This would therefore continue the medium term, low negative impact on a receptor of local value resulting in a continued **minor adverse** effect.

Marshy Grassland

9.9.271 The construction of the Gatwick Stream flood compensation area would further increase the area of marshy grassland present on the site above the pre-construction area once it has been constructed. This would result in a long-term low beneficial impact resulting in a **minor beneficial** significance of effect.

9.9.272 Any delays in the establishment of marshy grassland would result in a continued medium-term, low negative impact on a receptor of local value which would result in a **minor adverse** effect.

Species

Breeding Bird Assemblage (including NERC Species of Principal Importance and BoCC Red or Amber Listed species)

9.9.273 The majority of the suitable habitat for breeding birds that would be lost due to the Project would have been lost prior to 2033. In the period 2033 to 2038, the habitats created within mitigation areas early in the Project would be well developed with most (except woodland) having reached their desired maturity by 2038. Due to there still being a reduction in the amount of woodland habitat, there would still be an adverse impact on breeding birds.

9.9.274 An area of broadleaved plantation would be affected during the construction of the flood compensation area in the east of the Project site. However, the amount of habitat to be affected is relatively small compared to the overall habitats present within and immediately adjacent to the Project site boundary and therefore the impact on the breeding bird assemblage in this area would be negligible. This would have a **negligible** effect on a feature which is of County value.

Wintering Bird Assemblage (including BoCC Red or Amber listed species)

9.9.275 During surveys undertaken in 2018 and 2019, there were no wintering bird species recorded in any numbers which were considered to be of national or international significance. Furthermore, new planting undertaken in other parts of the Project site would be establishing and would provide alternative foraging habitats, therefore resulting in a negligible medium term impact on a receptor of local value which would have a **negligible** effect.

Grass Snake

9.9.276 The construction of the flood compensation area east of the Gatwick Stream would affect some peripheral habitats between woodland and grassland and the habitats along the Gatwick Stream corridor that could be used by the low population of grass snake present in this area. A translocation exercise would be undertaken to move grass snakes into existing retained habitat protected from construction areas prior to construction works affecting the existing habitat.

9.9.277 Due to the small area of suitable habitat that would be affected and the low population of grass snake present (which is of local value), this would have a negligible, medium term impact on the grass snake population present resulting in a **negligible** effect.

9.9.278 The creation of semi-improved neutral grassland and marshy grassland within the Gatwick Stream flood compensation area and along the banks of the realigned River Mole would create new, high value habitats for grass snake resulting in a long-term, low beneficial impact. This would have a **minor beneficial** effect.

9.9.279 Any failure of proposed habitat creation within these areas would result in a decrease in the expected extent of habitat for grass snakes. It is considered unlikely that there would be a complete failure of habitat creation and there would continue to be retained habitats within both areas where grass snake were recorded. Measures to remediate any failure would be put in place ensuring any impact was no more than medium-term. Therefore, this would result in a medium-term low impact on the grass snake population which was of local value, resulting in a **minor adverse** effect.

Great Crested Newt

9.9.280 A medium population of GCN was recorded in two closely located ponds in the east of the Project site within woodland near to Crawley Sewage Treatment Works. Parts of the Project site fall within 500 metres of the ponds.

9.9.281 A proposed flood compensation area would be located within 500 metres of the ponds within the biodiversity area (LERL). However, a large basin associated with the sewage works is present between the ponds and flood compensation area, which would present a barrier to GCN dispersal. It is likely that GCN would need to commute around the basin to reach this part of the site which would cover a distance of more than 500 metres. This would significantly reduce the likelihood of GCN being present.

9.9.282 A translocation exercise would be undertaken as a precaution within parts of the biodiversity area (LERL), and GCN would be moved to existing retained and protected habitat around the boundaries of the Flood Compensation Area or within habitats closer to the ponds.

9.9.283 Due to the distance of the affected habitats from the ponds, the number of GCN translocated is expected to be low. Therefore, the medium-term impacts would be low and the effects on the GCN population of local value would be **negligible**.

Common Toad

9.9.284 The semi-improved neutral grassland in the east of the site would be affected, resulting in a loss of habitat for common toad. This would account for a relatively small loss given the overall habitat resource within the Project site.

9.9.285 Newly created grassland habitats within the flood compensation areas and mitigation area in the west of the site would continue to increase the habitat resource for common toad resulting in a long term, low beneficial impact on a receptor of local value. This would result in an overall **negligible** effect.

9.9.286 The failure or delay in new areas of habitat establishing would have a medium term low negative impact which would also have a **negligible** effect.

Badger

9.9.287 No works would be undertaken within close proximity of the new badger sett.

9.9.288 The continued increase in construction traffic and associated movements in areas around setts on site would mean that there would be the potential for a corresponding increase in road mortality for badgers using the site. However, it is not expected that badger movement (principally at night) and construction would overlap significantly. There is also the risk of badgers accessing construction areas. The mitigation measures designed into the Project would be implemented to ensure that no badgers are harmed during the construction phase.

9.9.289 Implementation of these best-practice measures would ensure that any impact on the badger population, which is of local value, during construction would be negligible. This would result in a **negligible** effect.

Otter

9.9.290 No signs of otters have been confirmed within the Project site boundary, but they are known to be present within the wider area and there is potential for them to utilise the River Mole and Gatwick Stream. The river corridors would be monitored prior to and during the construction of the Gatwick Stream flood compensation scheme to detect any otter presence and to inform whether mitigation is required.

9.9.291 Implementation of best-practice methods for pollution prevention (to be secured via the CoCP) would ensure that all impacts to on otters, should they be present in the wider catchments, would be negligible. This would give rise to a **negligible** effect to a receptor of local value.

Assemblage of Bat Species

9.9.292 The majority of the bat activity recorded in the Gatwick Stream flood compensation area was associated with the mature tree lines and areas of woodland that border it. The flood compensation area has been designed to retain the majority of the tree lines within this area but there would be a loss of a small amount of plantation woodland. This would result in the very small loss of foraging habitat and would not be considered large enough to prevent bats from commuting to adjoining areas.

9.9.293 The overall long-term impact on the bat assemblage would therefore be negligible, resulting in a **negligible** effect.

Bats (Bechstein's Bat and Barbastelle Bat)

9.9.294 The creation of the Gatwick Stream flood compensation area would result in a small loss of broadleaved plantation. Bechstein's bat roosts were identified in woodland to the north and east of the proposed flood compensation area but no confirmed activity from Bechstein's bats was recorded within it. It is likely that Bechstein's bats would utilise the habitats present at times. The impact of losing a very small amount of foraging habitat is considered to be negligible in the long-term on the population, which is of County value. This would give rise to a **negligible** effect.

Hedgehog

9.9.295 Areas of suitable habitat for hedgehog would be affected by the Project temporarily and permanently during the construction phase, including a plantation woodland and grassland, but further areas would be retained, and the loss would account for a small part of the overall habitat resource. Post construction, areas of suitable habitats would be restored, and new areas of suitable habitat would be establishing within the mitigation area in the west of the site.

9.9.296 In the long-term, there would be a low beneficial impact to a receptor of local value resulting in a **minor beneficial** effect.

Terrestrial Invertebrate Assemblage

9.9.297 During this period, the new areas of flood compensation would have been created and would be establishing. No further works to areas that might support terrestrial invertebrate assemblages of conservation interest are proposed in this period. This would result in the same long-term, low beneficial impact and **minor beneficial** effect identified previously.

Shining Ramshorn Snail

9.9.298 During this period, the new River Mole diversion would have been created and would be establishing. No further works to areas that might support this species are proposed in this period. Ongoing implementation of pollution and sediment control measures (described in the CoCP) would ensure water quality is maintained. This would result in the same long-term, low beneficial impact and **negligible** effect identified previously.

Fish

9.9.299 During this period, the new River Mole diversion would have been created and would be establishing. No further works to areas that might support fish are proposed in this period. Ongoing implementation of pollution and sediment control measures (described in the CoCP) would ensure water quality is maintained. This would result in the same long-term, low beneficial impact and **negligible** effect identified previously.

Further Mitigation

9.9.300 The assessment is based on the maximum design scenario and as such assumes all habitats would be lost within the boundary of each development plot except where planting plans are currently included in the Project design.

9.9.301 It is considered that any additional mitigation required to remediate failures in habitat creation and/or protected species mitigation would have been rectified in the period 2030 to 2032 for habitats created in 2024 to 2029. If any additional mitigation were required for these areas in 2033 to 2038, it would be unlikely to be significant or on a large scale. Mitigation measures could be required to remediate failures in habitat creation resulting from the highways improvement works completed in 2030 and 2032.

Future Monitoring

9.9.302 In 2033 to 2038, the success of habitat creation and mitigation measures for bats, GCN and grass snake would continue to be monitored. The effects of success or failure would remain the same as those assessed previously.

9.9.303 Continued monitoring of the populations of bats, GCN and grass snake would be required.

9.9.304 Monitoring of any habitat creation would also be required to determine its success and to inform whether any remediation works were required.

Significance of Effects

9.9.305 The proposed monitoring would be undertaken as part of the Project; therefore, the significance of effects would remain as presented above.

Design Year: 2038

9.9.306 The majority of impacts on ecology are associated with the construction of the Project and would therefore have occurred by 2038. Details below are provided with respect to those receptors where there is the potential for an impact to occur during the operational phase of the Project.

Designated Sites

9.9.307 The Project would be fully built out by 2038, resulting in an increase to approximately 75.6 million passengers per annum (mppa). This would result in an increase in road vehicle emissions and aviation emissions from an increase in passengers travelling to the airport and taking flights.

9.9.308 An air quality assessment for 2038 is being completed and will be reported in the ES.

Watercourses, Aquatic Invertebrates and Fish

9.9.309 Operational surface water management and associated discharge would continue to be regulated by the airport's Environment Agency permit (see Chapter 11 Water Environment). As such, the magnitude of impact and significance of effect on watercourses, along with associated aquatic invertebrate and fish would therefore be **no change.**

Bats

9.9.310 The increased capacity of the airport would result in an increase in the number of vehicles on the roads travelling to and from it. The revised highway layout would also result in the creation of flyovers moving vehicles from ground level to above ground level.

9.9.311 Crossing point and activity surveys for bats at the Riverside Garden Park and along the A23 found that the main commuting route used by bats was the River Mole corridor with the road not being used significantly, possibly due to the high light levels and existing levels of disturbance present. Therefore, the operation of the road network during the construction phase is unlikely to have any impact on bat foraging or commuting routes. The magnitude of impact and significance of effect would therefore be **no change.**

9.9.312 The potential for impacts to bats from changes to air traffic movements associated with the operational phase of the Project will be assessed fully in the ES. However, radio tracking of Bechstein's and other species has shown that bats mainly use the periphery of the airport, where habitats are of higher quality, with only occasional use of the airfield and more disturbed areas. Therefore, impacts to bats from the operation of the airport from changes to air traffic movements is anticipated to be of negligible magnitude and significance.

Badger

9.9.313 The increase in operational traffic surrounding the Project site would mean that there would be the potential for a corresponding increase in road mortality for badgers using the Site. However, the main traffic increases would be associated with movements along the A23, well away from any existing badger population. Therefore, it is likely that the impact of the operational phase of the Project on badger would be negligible. This would result in a **negligible** effect.

Otter

9.9.314 The increase in operational traffic surrounding the Project site would mean that there would be the potential for a corresponding increase in road mortality for otter using the watercourse corridors. However, the river bridges would be maintained with sufficient room beneath to enable safe passage along the rivers for otter. Therefore, it is likely that the impact of the operational phase of the Project on otter would be negligible. This would result in a **negligible** effect.

9.9.315 No other operational activities would have an effect on ecology and nature conservation.

9.9.316 The habitats created by the Project would have established or be establishing by 2038 and the protected and notable species present would be benefitting from their presence. The overall effect of the Project on ecology and nature conservation will be reported in the ES.

9.10. Potential Changes to the Assessment as a Result of Climate Change

9.10.1 There is considerable uncertainty in relation to how species and habitats will respond to changing conditions and how management practices may change as a result of climate change. Some qualitative observations of potential climate change impacts on habitats and species that may occur in the vicinity of Gatwick are outlined below, summarised from Moorcroft & Speakman (2015).

- Wetlands: Reduction in summer rainfall would adversely affect many wetland habitats, such as those associated with the flood compensation areas. Human-induced impacts from drainage and use of fertilisers have had a greater impact than climate change on freshwater ecology to date.
- Grasslands: Some grasslands are likely to be very sensitive to changes in rainfall, particularly those that are associated with waterlogged conditions for part or all of the year. An increase in summer droughts could lead to a decline in distinctive wet grassland communities, including water meadows and rush pastures. This is also relevant to the habitats that are proposed within the flood attenuation areas.
- Woodlands: Beech, birch and sycamore are more sensitive to drought than other species. Increased frequency and / or severity of drought could lead to major changes in the composition and structure of woodland. These species are present within the vicinity of Gatwick but do not occur in high quantities within the habitats present within the Project site boundary.
- Reptiles and amphibians: Reductions in frog and toad populations are consistent with low summer rainfall and consequent lower soil moisture during drier summers, alongside other factors such as habitat loss. Common lizards, smooth newts and adders are predicted to lose suitable climatic conditions across England under many climate change scenarios but may expand their range in Scotland.
- Mammals: Climate change may affect bat populations through changes in their yearly hibernation cycle, breeding success and food availability. Reduced water flow in rivers would adversely affect water voles and otters. Milder winters could result in increasing populations of some species such as badgers as a result of increasing food availability and an earlier onset of spring.
- Non-native species: A change in climate could increase the colonisation of non-native flora and fauna as habitats alter and become more favourable for them.

9.10.2 The mitigation measures designed into the Project, both for ecology and nature conservation and other disciplines, take into account potential changes associated with climate change. For example, the plant species used in landscaping proposals would be tolerant of changes to the climate and would not include species that would be readily susceptible to decline. The flood risk modelling considered changes to climate and the design of the flood attenuation areas will consider this ensuring there is sufficient storage of flood waters so that they do not affect drier habitats. The flood compensation areas and new ponds would be designed to have permanently damp and wet areas to support the species reliant on these conditions. The potential for the success of mitigation measures to be affected by climate change is therefore low.

9.10.3 The assessment of effects for the operational phase on ecology and nature conservation is not therefore anticipated to be affected by climate change.

9.11. Cumulative Effects

Zone of Influence

9.11.1 The zone of influence (ZoI) for ecology and nature conservation has been identified based on the spatial extent of likely effects. The ZoI extends to 20 km for European statutory designated sites. The effect on European statutory designated sites is covered in the Habitat Regulations Assessment in Appendix 9.9.1.

9.11.2 The ZoI for habitats and species extends up to 2 km from the Project site boundary.

Screening of Other Developments and Plans

9.11.3 The Cumulative Effect Assessment (CEA) takes into account the impact associated with the Project together with other developments and plans. The projects and plans selected as relevant to the CEA presented within this chapter are based upon the results of a screening exercise undertaken as part of the 'CEA short list' of developments (see Appendix 19.4.1). Each development on the CEA long list has been considered on a case-by-case basis for scoping in or out of this chapter's assessment based upon data confidence, effect-receptor pathways and the spatial/temporal scales involved.

9.11.4 In undertaking the CEA for the Project, it is important to bear in mind that the likelihood of other developments and plans being constructed varies depending on how far along the planning process they are. For example, relevant developments and plans that are already under construction are likely to contribute to a cumulative impact with the Project (providing impact or spatial pathways exist), whereas developments and plans not yet approved or not yet submitted are less certain to contribute to such an impact, as some may not achieve approval or may not ultimately be built due to other factors. For this reason, all relevant development and plans considered cumulatively alongside the Project have been allocated into 'Tiers', reflecting their current stage within the planning and development process. Appropriate weight is therefore given to each Tier in the decision-making process when considering the potential cumulative impact associated with the Project (eg it may be considered that greater weight can be placed on the Tier 1 assessment relative to Tier 2). Further details of the screening process for the inclusion of other developments and plans in the short list and a description of the Tiers is provided in Chapter 19: Cumulative Effects and Inter-relationships.

9.11.5 The specific developments scoped into the CEA for ecology and nature conservation and the Tiers into which they have been allocated, are outlined in Table 9.11.1. The developments included as operational in this assessment have been commissioned since the baseline studies for this Project were undertaken and as such were excluded from the baseline assessment. Full details of each of the developments is provided in Appendix 19.4.1.

9.11.6 Note that due to the uncertainty regarding when Heathrow's third runway will come forward, it has not been included in the cumulative assessment for ecology. Given the distance between the sites, overlapping direct impacts on ecology receptors are considered highly unlikely. Further, as set out in Chapter 13 Air Quality, the Heathrow third runway surface access narrative is predicated on a 'no more traffic' scenario, which is to say that total car traffic to Heathrow Airport

would be maintained at existing levels such that no greater air quality effects from traffic would occur. GAL will, however, keep this under review and as it progresses its work and prepares its final documents, including the formal Environmental Statement to accompany the application for development consent.

Table 9.11.1: List of Other Developments and Plans considered within CEA

Description of Development/Plan	Planning Phase	Distance from the Project	Date of Construction (if applicable)	Overlap with the Project?
Tier 1				
CR/2016/0858/ARM Forge Wood Employment Building, car parking, internal access roads, footpaths, parking and circulation areas, hard and soft landscaping and other associated infrastructure and engineering works.	Assumed under construction	1.6 km	2019	Construction
CR/2017/0810/FUL the temporary use (for a period of 5 years) of the site as a Park and Ride car park, comprising 892 car parking spaces (814 long stay) and associated infrastructure including offsite highway improvements and the temporary conversion of the existing bungalow into associated office space.	Awaiting decision	1.2 km	2021	Construction
CR/2018/0894/OUT Land North of Steers Lane; 185 residential dwellings with associated vehicle and pedestrian access, car parking and cycle storage and landscaping.	Assumed under construction	1.3 km	2020	Construction
2019/548/EIA Roundabouts Farm, Copthorne; 360 residential units made up of 2, 3 and 4-bedroom detached, semi-detached and terraced houses, and potentially some 1-bedroom flats and a small amount of commercial development of circa 7,000 sq ft.	Screening Decision	1.5 km	2021/2022	Construction and Operation (2026)
CR/2015/0552/NCC (and subsequent reserved matters and non-material amendment applications). Forge Wood. Allocated in Crawley Local	Awaiting decision	1.6 km	C. 2021	Construction

Description of Development/Plan	Planning Phase	Distance from the Project	Date of Construction (if applicable)	Overlap with the Project?
Plan 2030 (Adopted) known as Forge Wood. Erection of up to 1900 dwellings, 5000 sqm. of use class b1, b2 & b8 employment floorspace, 2500sq.m. of retail floorspace, a local centre/community centre (including a community hall), a new primary school, recreational open space, landscaping, the relocation of the 132kv ohv power line adjacent to the M23, infrastructure and means of access.				
CR/2015/0718/ARM Allocation within Crawley Local Plan 2021-2037 (Regulation 19). Approval of Reserved Matters for Phase 2B for 169 dwellings and associated works pursuant to outline permission CR/2015/0552/NCC for a new mixed use neighbourhood.	Approved	1.6 km	C.2021	Construction
EIA/20/0004 EIA Scoping for West of Ifield - allocated site. The proposed development is on a site of 194 hectares in size with a minimum of 3,250 homes and up to 4,000 homes along with social infrastructure, green infrastructure and highway links.	Screening Decision	1.5 km	Unknown	Construction
Tier 2				
None present				
Tier 3				
Land west of Balcombe Road, Horley Strategic Business Park - 83ha with 200,000 sqm office space.	Development Management Plan 2018-2027 (Reg 22 Submission)	0.4 km	Unknown	Unknown
Land north of Rosemary Lane - Identified for a potential ca. 150 housing units, 5.12 hectare site.	Housing & Traveller Site	1.4 km	Unknown	Unknown

Description of Development/Plan	Planning Phase	Distance from the Project	Date of Construction (if applicable)	Overlap with the Project?
	Plan (Adopted 2014)			
Land east of Ifield Road - Identified for a potential ca. 150 housing units, 9 hectare site with 5 hectares developable.	Housing & Traveller Site Plan (Adopted 2014)	1.4 km	Unknown	Unknown
Land off the Close and Haroldslea Drive: Residential allocation, up to 40 new homes, 2.4 hectare site.		1.2 km	Unknown	Unknown
Land West of Reigate Road, Hookwood Site Allocation Policy SA42: Site identified in the Reg 18 consultation draft local plan (Feb 2020 to March 2020) for 450 dwellings and two gypsy and traveller pitches.	Consultation draft local plan (Feb 2020 to March 2020)	0.3 km	Unknown	Unknown
Gatwick Airport Sewage Treatment Works: Land within the airport available for extension to the Crawley Sewage Treatment Works if required.		0 km	Unknown	Unknown

Cumulative Effects Assessment

9.11.7 A description of the significance of cumulative effects upon ecology and nature conservation receptors arising from each identified impact is given below.

9.11.8 Only receptors that the Project would have an effect on, and which are mobile species that could be affected by development within the wider area, have been included, unless the receptor is within a site that is closely connected to the Project site.

Initial Construction Phase: 2024-2029

9.11.9 The Tier 1 developments would result in the permanent loss of existing habitats and would have effects on protected and notable species, although losses would be compensated for. Construction of these developments could give rise to disturbance impacts, which have potential to result in greater disturbance to species if construction overlaps with the construction of the Gatwick Project.

9.11.10 There is less certainty on the potential effects of some of the Tier 3 developments due to the absence of ecology survey information. However, Horley Strategic Business Park, Land West of Reigate Road, Hookwood and Gatwick Airport Sewage Treatment Works are within close proximity or connected to the Project site and have greater potential to affect the same receptors as those identified on it.

Breeding Birds (Annex 1 EU Birds Directive and/or Listed under Schedule 1 of the WCA)

9.11.11 No Schedule 1 or Annex 1 birds were recorded within the Tier 1 developments and therefore no cumulative effects are foreseen.

Breeding Birds (NERC Species of Principal Importance and BoCC Red or Amber Listed Species)

9.11.12 The majority of the Tier 1 and 3 developments would result in the loss of nesting sites for breeding birds and Red and Amber listed species were recorded on Tier 1 sites. The developments would compensate for this loss through new landscape planting and the provision of bird boxes which in combination with the proposed mitigation on the Project site would ensure there would be a long-term, negligible impact.

9.11.13 Should nesting habitat be lost from all developments at the same time and no mitigation put in until the end of the developments, there is potential for there to be an overall decrease in nesting sites and increased competition to win suitable territories. This could potentially have a medium-term, medium impact on the bird assemblage, which is of local value, resulting in a **minor adverse** effect.

Grass Snake

9.11.14 Grass snake was recorded on two developments (West of Ifield and Forge Wood) within 2 km of the Gatwick Project site. The sites were located approximately 1.5/1.6 km away to the south east and south west of the Project. Grass snake ranges have been estimated to be between 1.29 hectares and 3.56 hectares but can extend up to 9.41 hectares (Reading and Jofre, 2009) so there is potential for the grass snake populations in the east and west of the Project site to be connected to the grass snake populations on the other development sites. Forge Wood includes the Gatwick Stream within its boundary which strengthens the habitat connectivity between the two areas. The West of Ifield project includes the River Mole within its boundary, however, the low value habitats associated with the airport separate the sites, including a culverted section of the watercourse which significantly reduces habitat connectivity for grass snake.

9.11.15 The Forge Wood development is due to be completed before the construction of the Gatwick Stream flood compensation area in 2036. The Project would affect habitats used by the low population of grass snake that was present in this part of the site but is predicted to have a negligible effect once mitigation measures are in place.

9.11.16 Mitigation measures would also be in place on the other development sites reducing potential impacts on the grass snake populations present. However, if the same grass snake population was present within all three areas, the loss of habitat and potential stress caused to individual grass snakes could result in a medium magnitude, medium-term impact. The cumulative effect on the grass snake population which is of local value would be **minor adverse**.

Great Crested Newt

9.11.17 Populations of GCN were identified on three other development sites within 2 km of the Project site; Forge Wood (1.6 km away); Land North of Steers Lane (1.3 km away) and West of Ifield (1.5 km away). Two sites are located to the south east of the Project site boundary and one is to the south west.

9.11.18 Whilst GCN have been recorded travelling up to 1.3 km from breeding ponds, they typically stay within the area approximately 250 metres from breeding ponds (English Nature, 2001). It is

therefore considered unlikely that GCN would commute from the known GCN breeding ponds on site to those within the nearby development sites.

9.11.19 If there was movement between the two areas, it is likely that GCN would be travelling through areas outside of parts of the Project site that would be affected by construction as the breeding ponds are to the east of them.

9.11.20 Horley Strategic Business Park, Land West of Reigate Road, Hookwood are not located near to parts of the Project site that have the potential to support GCN and therefore no cumulative effects are foreseen.

9.11.21 Gatwick Sewage Treatment Works would be located in close proximity to the known GCN population in the east of the Project site. The effects of the Project on this population would be negligible and given the small footprint of the sewage treatment works and the implementation of appropriate mitigation would result in no cumulative increased effects.

9.11.22 The impact of the Project with the three other developments within 2 km would therefore be negligible over a medium-term. The cumulative effect on GCN (a receptor of local value) would therefore be **negligible**.

Common Toad

9.11.23 The combined area of the Tier 1 and 3 developments would account for a relatively small loss of terrestrial habitat for common toad within the wider geographical area. There would therefore be no change to the medium-term, low impact that the Project would have in isolation. This would result in a cumulative **negligible** effect on a receptor of local value.

Badger

9.11.24 Badger setts were identified within two Tier 1 developments; Forge Wood and West of Ifield, but some survey results were confidential so there is potential for them to be present on other sites. Given the distance between the other developments and the known badger territories within the Project site boundary it is considered unlikely that the same social group of badgers would be present within other developments. Therefore, the Project would not contribute to any cumulative effect greater than the effect of the Project individually.

9.11.25 Badger presence is not known within the Tier 3 sites but given their close proximity to the Project site there is potential for the badger social groups present to also use these sites. The land that may be used for any future sewage improvements, if required, is connected to the Project site in an area where badgers were recorded and could therefore affect badger territory. The small footprint of the works and the implementation of appropriate mitigation measures would result in a negligible cumulative effect.

9.11.26 Horley Strategic Business Park and Land West of Reigate Road, Hookwood adjoin parts of the Project site where levels of badger activity were low and therefore the badger social groups would be unlikely to be affected by the developments once suitable mitigation measures were in place to protect them during construction. No cumulative effects are foreseen.

Otter

9.11.27 No signs of otter were identified on other development sites. No cumulative effects are therefore envisaged.

Assemblage of Bat Species

9.11.28 No confirmed bat roosts were identified on any of the Tier 1 or 3 developments. Bat activity was recorded with species assemblages being similar to those recorded on the Project site. Bats are highly mobile species and, therefore, there is potential for the same bats to be utilising foraging habitat within more than one proposed development site. There is also potential for bats displaced from one development site to utilise habitats on another and therefore be affected by habitat loss at more than one location.

9.11.29 The creation of new foraging habitat early in the Project programme would help to reduce the effects of habitat loss. Given that higher value foraging habitat such as woodland takes a long time to establish, there is potential for there to be a long-term loss of habitat for foraging and commuting bats.

9.11.30 All of the developments combined account for a relatively small area with substantial areas of suitable habitat being retained within the wider landscape, including high value habitats such as woodland. The impact of losing foraging habitat on all of the development sites could therefore have a long-term, medium impact on the bat assemblage, which is of local value, resulting in a **minor adverse** effect.

Bats (Bechstein's Bat and Barbastelle Bat)

9.11.31 Bechstein's bat was not confirmed to be present on any Tier 1 or 3 site. However, bats from the *Myotis* family were recorded and there is potential for some of those to be Bechstein's bat.

9.11.32 The Tier 1 and 3 developments include residential developments on the outskirts of Gatwick, Copthorne and Crawley which comprise farmland habitats likely to be of some value to Bechstein's bats. The Bechstein's bats recorded on the Project site are considered most likely (subject to additional survey work) to be part of a population centred around higher value habitat to the west of Gatwick. There are few developments proposed in the area between and those that are proposed are unlikely to significantly affect higher value Bechstein's bat habitat (such as woodland). The cumulative impact on the population, which is of County value, is therefore considered to be negligible, resulting in a **negligible** effect.

9.11.33 Barbastelle was recorded at two developments, Forge Wood and West of Ifield, both large residential-lead developments approximately 1.5/1.6 km south of the Project boundary. The low detection rate of barbastelle both within the Project site and the Tier 1 and 3 developments suggests they do not frequently utilise habitats in close proximity to urban areas, or that the population in the area is very small. Larger areas of woodland within the surrounding landscape are predominantly not affected by proposed developments.

9.11.34 The cumulative impact of loss of foraging habitat therefore appears to be negligible. All developments would need to provide compensation for the loss of foraging and commuting habitat through new habitat creation. Therefore, the overall effect on barbastelle bats, which are of County value, would be **negligible**.

Harvest Mouse

9.11.35 The combined area of the Tier 1 and 3 developments would account for a relatively small loss of terrestrial habitat for harvest mouse within the wider geographical area. There would therefore be no change to the effect that the Project would have in isolation.

Hedgehog

9.11.36 The combined area of the Tier 1 and 3 developments would account for a relatively small loss of terrestrial habitat for hedgehog within the wider geographical area. There would therefore be no change to the effect that the Project would have in isolation.

2030-2032

9.11.37 Two developments would be potentially under construction during the first full year of operation when parts of the Project would still be under construction; West of Ifield (1.5 km away) and Roundabouts Farm, Copthorne (1.9 km away). There is potential for other Tier 3 projects to also be under construction.

9.11.38 No detailed ecology assessments have been undertaken for these other developments and therefore a detailed assessment of cumulative effects cannot be undertaken at this stage.

9.11.39 A number of developments would be operational, and any habitat creation would be complete thereby compensating for any construction phase cumulative effects and potentially offering additional habitats to more mobile species.

2033-3038

9.11.40 The construction of all developments with known timescales would be complete by 2033. Any habitat creation would be complete thereby compensating for any construction phase cumulative effects and potentially offering additional habitats to more mobile species.

9.11.41 Tier 3 developments could be under construction but without detailed ecology assessments it is not possible to determine cumulative effects at this stage.

Design Year: 2038

9.11.42 Tier 3 developments could be under construction but without detailed ecology assessments it is not possible to determine cumulative effects at this stage.

9.12. Inter-Related Effects

9.12.1 The assessment for ecology and nature conservation has been undertaken with consideration of inter-relationships between topics. This has included the inter-relationships with Chapter 13: Air Quality, Chapter 11: Water Environment and Chapter 12: Traffic and Transport.

9.12.2 No other inter-relationships have been identified.

9.13. Summary

9.13.1 The Project site largely comprises low value habitats associated with the airport and its infrastructure. The site consists of large areas of hard standing and amenity grassland with areas of ornamental shrub and tree planting. These areas are predominantly located within the centre of the Project site with areas of higher value habitats to the east and west.

9.13.2 The Gatwick biodiversity area east of the airport comprises a variety of grasslands with trees, woodland and hedgerows. Gatwick Stream flows through the site and larger areas of semi-natural broadleaved woodland surround it, including areas of ancient woodland. Existing car parking areas to the north include linear strips of woodland which connect to the woodland to the south.

9.13.3 The River Mole corridor (NWZ biodiversity area), comprising a variety of damp and dry grasslands, wetland areas, the stream and semi-natural broadleaved woodland is present in the western part of the site. This includes an area of ancient woodland.

9.13.4 Smaller areas of higher value habitat are present to the north and south of the airport and include Riverside Garden Park which comprises semi-natural broadleaved woodland interspersed with areas of grassland and tall ruderal vegetation. Gatwick Stream flows through it.

9.13.5 Crawter's Field to the south of the airport comprises grassland and semi-natural broadleaved woodland. Crawter's Stream flows through this area but is heavily managed, reducing its ecology value.

9.13.6 An assessment of the effects found that the Project would have no effect on statutory or non-statutory designated sites or areas of ancient woodland. The effects on habitats and species are generally found to be not significant. However, the initial construction phase (2024-2029) of the Project would require the removal of species-poor hedgerow and loss of plantation woodland and scrub habitat. The loss of these habitats would result in moderate adverse and significant effects that would not be mitigated for until the end of the construction phase. Additional hedgerow planting would be undertaken early in the construction phase on other parts of the Project site, which would enhance habitat connectivity in these areas. This would result in a moderate beneficial and significant effect in the longer term.

9.13.7 The Project would require the removal of habitats in the initial construction phase which would result in the temporary displacement of breeding birds. The loss of suitable breeding sites would result in a moderate adverse and significant effect during the initial construction phase (2024-2029). The habitat loss would also result in a temporary moderate adverse effect on the bat and invertebrate assemblages. This would be a temporary effect until new tree, grassland and shrub planting had established.

Next Steps

9.13.8 Trees that would be affected by the Project will be identified and bat roost surveys undertaken to determine whether bat roosts are present, the species of bat using them and the number of bats.

9.13.9 Further surveys are proposed for GCN and bat activity to better understand their distribution and presence around the populations already identified.

9.13.10 The findings of all the additional surveys would be reported and an assessment of any effects included in the ES.

Table 9.13.1: Summary of Effects

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
Construction Phase 2024-2029 (Construction Effects up to first opening of Northern Runway)							
Statutory designated sites	International	No impact	Medium term	No Change	No Change	Not significant	Due to the distance of internationally, nationally and locally designated sites and the mitigation measures designed into the Project there would be no impact from the construction phase.
Statutory designated sites	National	No impact	Medium term	No Change	No Change	Not significant	
Statutory designated sites	County	No impact	Medium term	No Change	No Change	Not significant	
Non-statutory designated sites	County	No impact	Medium term	No Change	No Change	Not significant	The mitigation measures designed into the Project would ensure there was no impact from construction.
Ancient woodland	Regional	No impact	Medium term	No Change	No Change	Not significant	The mitigation measures designed into the Project would ensure there was no impact from construction.
Semi-natural broadleaved woodland and mature broadleaved trees	County	Loss of woodland	Long term	Low	Minor adverse	Not significant	Small parts of larger woodland areas would be lost and compensated for.
Hedgerows	County	Loss of species-poor hedgerow to South	Medium term	Medium	Moderate adverse	Significant	The hedgerows and the habitat connectivity they

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
		Terminal roundabout improvements					provide would be lost and compensated for once new planting is established.
		Reconfiguration of airport facilities	Long term	Medium	Moderate beneficial	Significant	Initial loss compensated for by replacement planting.
Watercourses (River Mole and Gatwick Stream)	County (River Mole)	Construction of new channels for flood compensation resulting in a small loss of bankside habitat.	Short term	Negligible	Negligible	Not significant	The effects would be negligible due to very short sections of river being affected and being replaced with higher value habitat.
		The creation of new bankside habitats and channels (associated with flood compensation areas) that are intermittently wet would increase the overall habitat resource	Long term	Low	Minor beneficial	Not significant	
		Increase in sediment and decrease in water quality	Short-term	Negligible	Negligible	Not significant	The effects would have a minimal effect on the ecology of the watercourse.
		Diversion of the River Mole	Medium term	Low	Minor adverse	Not significant	A relatively short section of stream would be affected

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
							meaning the effects would not be significant.
		Creation of a new section of river channel providing high value habitats	Long term	Medium	Minor beneficial	Not significant	Successful creation of the new channel and establishment of native flora and fauna would have a beneficial effect.
		Failure or delay in creating new habitat	Medium term	Low	Minor adverse	Not significant	Delays or the need for remediation work could result in the impact from construction being extended.
Ponds (NERC S.41 Habitat)	County	No impact	Medium term	No Change	No Change	Not Significant	The mitigation measures designed into the Project would ensure there was no impact from construction.
Ponds (not NERC S.41 Habitat)	Local (Pond A, FFJ and F)	Loss of two ponds	Medium term	Low	Minor adverse	Not significant	The effects would be medium-term as the ponds would be replaced.
		Creation of two ponds	Long-term	Low	Negligible	Not significant	

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
		Overall impact of initial loss followed by new pond creation	Long-term	Low	Minor adverse	Not significant	
Semi-improved neutral grassland	Local	Loss of grassland	Long term	Medium	Minor adverse	Not significant	The area of loss would be relatively small and only until new habitats had established. There would be a net increase in the amount of semi-improved neutral grassland on the Project site post construction.
		Grassland creation	Long-term	Medium	Minor beneficial	Not significant	
Marshy grassland	Local	Loss of grassland	Medium term	Low	Minor adverse	Not significant	The loss of grassland would be mitigated for through new grassland creation at the end of the construction phase resulting in a long-term gain.
		Grassland creation	Long-term	Medium	Minor beneficial	Not significant	
Broadleaved plantation woodland and associated scrub	Local	Loss of woodland and scrub and loss of habitat connectivity	Long-term	High	Moderate adverse	Significant	The long-term loss of woodland and scrub habitat would reduce habitat connectivity across the landscape until new woodland planting had established.
		New woodland creation and improved connectivity	Long-term	Low	Minor beneficial	Not significant	

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
Flora: Bluebell and pennyroyal	Local (Bluebell)	Loss of small areas of woodland habitat and translocation to new habitat	Long-term	Low	Minor adverse	Not significant	Some bluebell would be translocated and some would survive but there would be some loss.
	Local (Pennyroyal)	Disturbance to Pond F	Medium-term	Medium	Minor adverse	Not significant	Pennyroyal would be protected from physical damage but could be affected by changes to water quality of Pond F.
Flora: Lesser quaking grass, narrow-lipped helleborine, ragged robin and solomon's seal	Local	No impact	Long-term	No Change	No change	Not significant	Measures to protect habitats of value from pollution events would ensure the plants were not affected.
Breeding birds (Listed under Schedule 1 of the WCA)	Up to Regional	No current impacts identified. Further surveys are required to determine any future impacts	Short-term	No change	No change	Not significant	No Annex or Schedule 1 birds confirmed to be breeding in 2019 so no effects are foreseen. However, as birds can change their nesting sites year on year repeat surveys would be required during construction to assess potential future effects.

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
Breeding bird assemblage including species of conservation interest (confirmed or possible);	County (reed bunting)	Loss of nesting sites followed by increase in nesting sites	Medium term	Medium	Moderate adverse	Significant	The medium term loss of habitat would be compensated for through new habitats being created in the long-term.
		Increase in nesting sites	Long-term	Low	Minor beneficial	Not significant	
		Overall impact of pond loss followed by pond creation	Long-term	Low	Minor adverse	Not significant	
	County (skylark)	Loss of nesting sites	Short-term	Low	Minor adverse	Not significant	The short term loss of habitat would be compensated for through new habitats being created.
	County (other)	Loss of suitable nesting sites for a range of species	Long-term	Medium	Moderate adverse	Significant	There would be a loss of nesting sites between habitats being lost and new habitats being sufficiently established to provide alternative nest sites which would have a significant effect on nesting birds. This would be reduced once new habitats were created.
		Creation of replacement and additional nesting sites	Long-term	Low	Minor beneficial	Not significant	
Wintering bird assemblage	Local	Loss of foraging habitat	Medium term	Low	Minor adverse	Not significant	There were no wintering bird species recorded in numbers of national or international significance

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
Grass snake	Local (Mole corridor (NWZ))	Loss and disturbance to habitat	Medium term	Low	Minor adverse	Not significant	Mitigation measures to move reptiles from construction areas and to create new habitat would ensure no effects were significant.
	Local (LERL)	No impact	None	No Change	No Change	No change	The grass snake population in this part of the site would not be affected at this stage of the Project
Great crested newt	Local (Western population)	Habitat creation	Long-term	Medium	Minor beneficial	Not significant	The GCN population to the West of the River Mole would not be affected by construction activities but a new pond created in a mitigation area would potentially provide a new breeding site.
	Local (Eastern population)	Loss and disturbance to habitat	Medium term	Low	Negligible	Not significant	Mitigation measures to move GCN from construction areas and to create new habitats would ensure no significant effect occurred.
Common toad	Local	Loss and disturbance to habitat	Long-term	Low	Negligible	Not significant	Substantial areas of suitable habitat would be retained and new habitats would be created meaning the

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
							temporary loss of habitat would not have a significant effect.
Badger	Local	Closure of main sett	Medium term	Low	Minor adverse	Not significant	An artificial sett would be created to compensate for the loss of a main sett.
Badger	Local	Risk of injury from construction works	Long-term	Negligible	Negligible	Not significant	Mitigation limiting vehicle speeds and making construction team aware of risks would reduce any effects.
Otter	County	Potential for disturbance if present	Long-term	Negligible	Negligible	Not significant	No otters have been recorded within the Project site boundary but on going monitoring would be undertaken during the construction phase.
Assemblage of other bat species	Local	Construction of airfield satellite contractor compound and diversion of River Mole	Long-term	Medium	Minor Adverse	Not significant	Mitigation during construction and long-term replacement planting would ensure effects were not significant.
		Construction of Surface access satellite contractor compound, South	Long-term	High	Moderate Adverse	Significant	The long-term loss of woodland, hedgerows and shrubs that form a linear corridor through the north of

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
		Terminal and North and South Terminal improvement works					the Project site would affect bat behaviour until new planting had established.
		Replacement woodland planting	Long-term	Negligible	Negligible	Not significant	
Bats (Bechstein's bat, barbastelle bat and alcathoe)	County	Loss of woodland and construction work in close proximity to high value habitat	Long-term	Low	Minor Adverse	Not significant	
Harvest mouse	Local	Loss and disturbance to habitat followed by the creation of new habitats	Medium term followed by long-term	Low	Negligible	Not significant	Areas of suitable habitat would be retained and new habitats would be created meaning the temporary loss of habitat would not have a significant effect.
Hedgehog	Local	Loss and disturbance to habitat	Medium term	Low	Minor adverse	Not significant	Areas of suitable habitat would be retained and new habitats would be created meaning the temporary loss of habitat would not have a significant effect.
Terrestrial Invertebrate assemblage	County	Habitat loss	Medium term	Medium	Moderate adverse	Significant	Habitat creation would compensate for the initial significant impact and result
		Habitat creation	Long-term	Low	Minor beneficial	Not Significant	

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
							in a long-term beneficial effect.
Shining Ramshorn Snail	Local	Habitat loss	Medium term	Low	Minor adverse	Not significant	Creation of the River Mole diversion will increase the overall length of riparian habitat for this species.
		Habitat creation	Long-term	Low	Negligible	Not significant	
Fish	Local	Habitat loss	Long-term	Low	Negligible	Not significant	Creation of the River Mole diversion will improve the flow characteristics of the river.
2030-2032 (Construction and Operational Effects)							
Statutory designated sites	International	No impact	Medium term	No Change	No Change	Not significant	Due to the distance of internationally, nationally and locally designated sites and proposed mitigation measures there would be no impact from the construction phase. The increase in vehicles accessing the site would not result in the predicted nitrogen oxides (NOx) concentration exceeding the critical level set for vegetation.
Statutory designated sites	National	No impact	Medium term	No Change	No Change	Not significant	
Statutory designated sites	County	No impact	Medium term	No Change	No Change	Not significant	

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
Non-statutory designated sites	County	No impact	Medium term	No Change	No Change	Not significant	The mitigation measures designed into the Project would ensure there was no impact from construction. There would be no operational effects.
Ancient woodland	Regional	No impact	Medium term	No Change	No Change	Not significant	The mitigation measures designed into the Project would ensure there was no impact from construction. There would be no operational effects.
Semi-natural broadleaved woodland and individual broadleaved trees	County	Loss of woodland in combination with loss from the South and North Terminal improvements	Long-term	Medium	Moderate adverse	Significant	The Project currently proposes a significant loss of woodland that is mitigated for through new woodland planting at the end of construction. The combined effect on habitat connectivity is significant.
Hedgerows	County	Loss of species-poor hedgerow at location of Pier 7	Medium term	Negligible	Negligible	Not significant	A species-poor hedgerow would be lost and replaced with a species-rich hedgerow.
Watercourses	County	Highway improvement in close	Medium term	Negligible	Negligible	Not significant	Pollution control measures would ensure no impact on

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
		proximity to both watercourses					watercourses during construction.
Ponds (NERC S.41 Habitat)	County	No impact	Medium term	No Change	No Change	Not significant	The mitigation measures designed into the Project would ensure there was no impact from construction. There would be no operational effects.
Ponds (not NERC S.41 Habitat)	Local (Pond D)	Increase in surface water discharge	Long-term	Negligible	Negligible	Not significant	The impacts would not have a significant effect on the pond.
	Local (new pond)	Pond creation	Long-term	Low	Minor beneficial	Not significant	A new pond would have a minor beneficial effect.
Semi-natural neutral grassland	Local	No impact	Medium term	No Change	No Change	Not significant	No impact predicted.
Marshy grassland	Local	Creation of new grassland	Long-term	Medium	Minor beneficial	Not significant	The construction of the flood attenuation areas would result in an increase in the amount of marshy grassland present on the site above pre-construction amounts
		Failure or delay in creating new habitat	Medium term	low	Minor adverse	Not significant	Delays or the need for remediation work could result

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
							in the impact from construction being extended.
Broadleaved plantation woodland and associated scrub	Local	No impact	Long-term	No change	No change	Not significant	This habitat would not be affected.
Flora: Bluebell	Local	Loss of woodland	Long-term	Low	Minor adverse	Not significant	Some bluebell would be translocated and some would survive but there would be some loss.
Flora: Lesser quaking grass, narrow-lipped helleborine, ragged robin and Solomon's seal	Local	No impact	Long-term	No change	No change	Not significant	These species would not be affected.
Breeding birds (Listed under Schedule 1 of the WCA)	Up to Regional	No current impacts identified. Further surveys are required to determine any future impacts	Short-term	No change	No change	Not significant	No Annex or Schedule 1 birds confirmed to be breeding in 2019 so no effects are foreseen. However, as birds can change their nesting sites year on year repeat surveys would be required during construction to assess potential future effects.

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
Breeding birds (NERC Species of Principal Importance and BoCC Red or Amber listed species)	County	Loss of suitable nesting sites for a range of species	Medium term	Medium	Moderate adverse	Significant	There would be a loss of nesting sites in addition to those already lost to highway related work between habitats being lost and new habitats being sufficiently established to provide alternative nest sites.
		Increase in nesting sites due to habitat creation establishing	Long-term	Low	Minor beneficial	Not significant	
Wintering bird assemblage	Local	Loss of foraging areas	Long-term	Negligible	Negligible	Not significant	there were no wintering bird species recorded in any numbers which were considered to be of national or international significance
Great crested newt	Local	No impact	Medium term	No Change	No Change	Not significant	Great crested newt would not be affected by construction activities being undertaken at this stage of the Project
Grass snake	Local	No impact	Medium term	No Change	No Change	Not significant	Grass snake would not be affected by construction activities being undertaken at this stage of the Project
Common toad	Local	No impact	Medium term	No Change	No Change	Not significant	Common toad would not be affected by construction activities being undertaken at this stage of the Project

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
Badger	Local	Increased construction traffic and associated movements	Medium term	Negligible	Negligible	Not significant	Mitigation measures would ensure risks from construction traffic were minimised.
Otter	County	Disturbance and reduced quality of habitat	Medium term	Low	Minor adverse	Not significant	Implementation of best-practice methods for pollution prevention (to be secured via the CoCP). Loss of woodland along Mole corridor resulting in loss of seclusion
Assemblage of Bat Species	Local	Loss of semi-natural broadleaved woodland due to Longbridge roundabout improvements	Long-term	High	Moderate adverse	Significant	The long-term loss of woodland resulting from all highway improvements in combination would have a significant effect on bat behaviour until new woodland planting had established.
		Woodland planting upon completion of highway improvements	Long-term	Low	Minor beneficial	Not significant	
		Increased artificial lighting from decked parking and hotels and loss of hedgerow at Pier 7	Long-term	Negligible	Negligible	Not significant	Mitigation designed into the lighting schemes for car parking and hotels would prevent excessive light spill onto adjoining habitats of value to bats.

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
Bats (Bechstein's bat)	County	Loss of some habitats and a reduction in connectivity from Longbridge roundabout improvements	Long-term	Low	Minor adverse	Not significant	Potential effects on commuting behaviour due to loss of woodland. New woodland planting would create new areas of foraging habitat for Bechstein's bats and restore habitat connectivity, though these new habitats will take time to establish and mature
Harvest mouse	Local	New habitats would have compensated for loss of existing habitat	Long-term	Low	Minor beneficial	Not significant	There would be an increase in habitat availability to compensate for any losses.
Hedgehog	Local	New habitats would have compensated for loss of existing habitat	Long-term	Low	Minor beneficial	Not significant	There would be an increase in habitat availability to compensate for any losses.
Terrestrial invertebrate assemblage	County	New habitats would have compensated for loss of existing habitat	Long-term	Low	Minor beneficial	Not significant	There would be an increase in habitat availability to compensate for any losses.
Shining ramshorn snail	Local	New habitats would have compensated for loss of existing habitat	Long-term	Low	Negligible	Not significant	There would be an increase in habitat availability to compensate for any losses.

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
Fish	Local	New habitats would have compensated for loss of existing habitat	Long-term	Low	Negligible	Not significant	There would be an increase in habitat availability to compensate for any losses.
2033-2038 (Construction and Operational Effects)							
Statutory designated sites	International	No impact	Medium term	No Change	No Change	Not significant	Due to the distance of internationally, nationally and locally designated sites there would be no impact from the construction phase. The increase in vehicles accessing the site would not result in the predicted nitrogen oxides (NOx) concentration exceeding the critical level set for vegetation
Statutory designated sites	National	No impact	Medium term	No Change	No Change	Not significant	
Statutory designated sites	County	No impact	Medium term	No Change	No Change	Not significant	
Non-statutory designated sites	County	No impact	Medium term	No Change	No Change	Not significant	The mitigation measures designed into the Project would ensure there was no impact from construction. There would be no operational effects.
Ancient woodland	Regional	No impact	Medium term	No Change	No Change	Not significant	The mitigation measures designed into the Project

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
							would ensure there was no impact from construction. There would be no operational effects.
Semi-natural broadleaved woodland and mature broadleaved trees	County	No impact	Medium term	No Change	No Change	Not significant	The mitigation measures designed into the Project would ensure there was no impact from construction. There would be no operational effects.
Hedgerows	County	No impact	Medium term	No Change	No Change	Not siignificant	The mitigation measures designed into the Project would ensure there was no impact from construction. There would be no operational effects.
Watercourses	County	Loss of a section of bankside habitat	Long-term	Low	Minor adverse	Not significant	A loss of a very small section of bankside habitat until new vegetation had established.
Broadleaved plantation woodland and associated scrub	Local	Loss of a small area of young plantation woodland from Gatwick Stream flood compensation area	Long-term	Low	Minor adverse	Not significant	A small loss of plantation woodland that would be compensated for within the wider Project.

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
Semi-improved neutral grassland	Local	Loss of grassland followed by replacement of grassland	Long-term	Negligible	Negligible	Not significant	New grassland would be created to compensate for any that was lost.
	Local	Failure or delay in creating new habitat	Medium term	Low	Minor adverse	Not significant	Delays or the need for remediation work could result in the impact from construction being extended.
Marshy grassland	Local	Creation of new marshy grassland	Long-term	Low	Minor beneficial	Not significant	There would be an overall gain in marshy grassland
		Failure or delay in creating new habitat	Medium term	Low	Minor adverse	Not significant	Delays or the need for remediation work could result in the impact from construction being extended.
Breeding birds (all non-Schedule 1 species)	County	Loss of nesting sites	Long-term	Negligible	Negligible	Not significant	Small areas of suitable habitats for birds to nest would be lost given the total resource on site and within the wider area.
Wintering bird assemblage	Local	Loss of foraging sites	Medium term	Negligible	Negligible	Not significant	The loss of habitat would be small and new habitats would have developed.
Grass snake	Local	Habitat loss	Medium term	Negligible	Negligible	Not significant	Mitigation measures would reduce the impact on the small population present.

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
		Habitat creation	Long-term	Low	Minor beneficial	Not significant	Habitat creation would increase the amount of habitat available to grass snake.
		Failure or delay in creating new habitat	Medium term	Low	Minor adverse	Not significant	Delays or the need for remediation work could result in the impact from construction being extended.
Great crested newt	Local (Eastern population)	Loss of habitat and disturbance to individual GCN	Medium-term	Low	Negligible	Not significant	Mitigation measures would reduce the impact on the population present.
Common Toad	Local	Creation of new terrestrial habitat within Flood Compensation Area	Long-term	Low	Negligible	Not significant	The increase in the amount of terrestrial habitat for common toad would not have a significant effect on the population.
	Local	Failure or delay in new areas habitat establishing	Medium term	Low	Negligible	Not significant	The failure or delay in new areas of habitat establishing could have a negligible effect.
Badger	Local	Impacts from construction traffic and activities	Medium-term	Negligible	Negligible	Not significant	Mitigation measures would reduce the potential effects on badgers

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
Otter	Local	Loss of habitat and disturbance to otters	Medium-term	Negligible	Negligible	Not significant	Mitigation measures would reduce the potential effects on otters
Assemblage of other bat species	Local	Small loss of foraging habitat for flood compensation area	Long-term	Negligible	Negligible	Not significant	The majority of the woodland and trees within this area would be retained.
Bats (Bechstein's bat)	County	Small loss of foraging habitat for flood compensation area	Long-term	Negligible	Negligible	Not significant	The majority of the tree lines within this area would be retained.
Hedgehog	Local	Small areas of habitat loss and the creation of new habitats	Long-term	Low	Minor beneficial	Not significant	New habitats would be created to compensate for those lost reducing the significance of any effect.
Terrestrial invertebrate assemblage	County	New habitats would have compensated for loss of existing habitat	Long-term	Low	Minor beneficial	Not significant	There would be an increase in habitat availability to compensate for any losses.
Shining ramshorn snail	Local	New habitats would have compensated for loss of existing habitat	Long-term	Low	Negligible	Not significant	There would be an increase in habitat availability to compensate for any losses.

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
Fish	Local	New habitats would have compensated for loss of existing habitat	Long-term	Low	Negligible	Not significant	There would be an increase in habitat availability to compensate for any losses.
Design year 2038 (Operational effects)							
Watercourses, Shining ramshorn snail and fish	Up to County	Changes to water quality from surface water discharge	Long-term	No Change	No Change	Not significant	Discharge of surface water will continue to be regulated by the EA to ensure water quality same as current permits.
Bats (all species)	County	Increased collision risk from road traffic	Long-term	No Change	No Change	Not significant	The A23 corridor is not used by significant numbers of bats.
Badger	Local	Increased collision risk from road traffic	Long-term	Negligible	Negligible	Not significant	Badger population located considerable distance from main areas of traffic increase (A23).
Otter	Local	Increased collision risk from road traffic	Long-term	Negligible	Negligible	Not significant	Otter will still be able to pass beneath the roads along the river corridors.

9.14. References

Legislation

Countryside and Rights of Way Act, 2000

Natural Environment and Rural Communities (NERC) Act 2006

Protection of Badgers Act, 1992

The Conservation of Habitats and Species Regulations 2017 (as amended)

The Hedgerows Regulations 1997

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Wild Mammals (Protection) Act 1996

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9.15. Glossary

Table 9.15.1: Glossary of Terms

Term	Description
BAP	Biodiversity Action Plan
BDIR	Birds Directive
BOA	Biodiversity Opportunity Area
BoCC	Birds of Conservation Concern
CAA	Civil Aviation Authority
CARE	Central Area Recycling Enclosure
CEA	Cumulative Effects Assessment
CIEEM	Chartered Institute of Ecology and Environmental Management
CoCP	Code of Construction Practice
CP	Country Park
CRoW	Countryside and Rights of Way
DMRB	Design Manual for Roads and Bridges
DRV	Designated Road Verge
eDNA	Environmental DNA (Deoxyribonucleic acid)
EIA	Environmental Impact Assessment
EPS	European Protected Species
ES	Environmental Statement
GAL	Gatwick Airport Limited
GCN	Great Crested Newt
HRA	Habitats Regulations Assessment

Term	Description
HSI	Habitat Suitability Index
IAACCF	Inter-agency Climate Change Forum
IEF	Important Ecological Feature
ILS	Instrument Landing System
JNCC	Joint Nature Conservation Committee
LERL	Land East of the Railway Line
LNR	Local Nature Reserve
LWS	Local Wildlife Site
NERC	Natural Environment and Rural Communities
NNR	National Nature Reserve
NOx	Nitrogen Oxides
NPPF	National Planning Policy Framework
NPPG	National Planning Practice Guidance
NPS	National Policy Statement
NWZ	North West Zone
NVC	National Vegetation Classification
ODPM	Office of the Deputy Prime Minister
PEIR	Preliminary Environmental Information Report
PINS	Planning Inspectorate
SAC	Special Area of Conservation
SNCI	Site of Nature Conservation Importance
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
TN	Technical Note
UKCP18	UK Climate Predictions 2018
WCA	Wildlife and Countryside Act
WHPT	Whalley Hawkes Paisley Trigg method
ZoI	Zone of Influence

Preliminary Environmental Information Report
Chapter 10: Geology and Ground Conditions

September 2021

Table of Contents

10 Geology and Ground Conditions

10.1. Introduction

10.1.1 This chapter of the Preliminary Environmental Information Report (PEIR) presents the findings of the Environmental Impact Assessment (EIA) work undertaken to date concerning the potential effects of the proposal to make best use of Gatwick's existing runways (referred to within this report as 'the Project') on geology and ground conditions.

10.1.2 This chapter covers land and groundwater quality, land instability and mineral resources. It includes an appraisal of baseline conditions informed through collation of data from a range of sources, including published data sources and previous ground investigation and assessment reports.

10.1.3 In particular, this PEIR chapter:

- sets out the existing and future environmental baseline conditions, established from desk studies, surveys and consultation to date;
- presents the potential environmental effects on geology and ground conditions arising from the Project, based on the information gathered and the analysis and assessments undertaken to date;
- identifies any assumptions and limitations encountered in compiling the environmental information; and
- highlights any necessary monitoring and/or mitigation measures that could prevent, minimise, reduce or offset the possible environmental effects identified in the EIA process.

10.1.4 This chapter is accompanied by:

- Appendix 10.3.1: Summary of Stakeholder Scoping Responses - Geology and Ground Conditions;
- Appendix 10.9.1: Preliminary Risk Assessment;
- Figure 10.6.1: Superficial Geology;
- Figure 10.6.2: Bedrock Geology;
- Figure 10.6.3: Potential Areas of Concern;
- Figure 10.6.4: Previous Ground Investigation Locations and Potential Areas of Concern; and
- Figure 10.6.5: Soils and Groundwater Exceedances.

10.1.5 The PEIR will inform pre-application consultation. Following consultation, comments on the PEIR will be reviewed and taken into account, where appropriate, in preparation of the Environmental Statement (ES) that will accompany the application to the Planning Inspectorate for development consent.

10.2. Legislation and Policy

10.2.1 This section of the chapter reviews legislation and planning policy that is relevant to assessing the effects of the Project on geology and ground conditions.

Legislation

Water Resources Act 1991 (as amended 2009)

10.2.2 The Water Resources Act principally relates to the protection of controlled water (ie rivers, lakes, canals and groundwater) from pollution. It sets out the responsibilities of the Environment Agency in relation to water pollution, resource management, flood defence, fisheries and, in some areas, navigation. It also regulates discharges to controlled waters, namely rivers, estuaries, coastal waters, lakes and groundwater.

The Environment Act 1995

10.2.3 The Environment Act 1995 (Section 57) amends the Environmental Protection Act (EPA) 1990 and makes provisions for a risk based framework for the identification, assessment and management of contaminated land within the UK. The provisions of the Act came into effect in April 2000.

10.2.4 Part IIA of the EPA 1990 is implemented by the Contaminated Land (England) Regulations 2006 and the Contaminated Land (England) (Amendment) Regulations 2012.

10.2.5 The Part IIA regime is aimed at ensuring that actions taken with respect to contaminated land are directed by a technically well-founded assessment of risk that considers the 'contaminant-pathway-receptor' scenario (contaminant linkage). Under the legislation, contaminated land is defined as:

'…any land which appears to the Local Authority in whose area it is situated to be in such a condition, by reason of substances in, on or under the land, that:

(a) 'Significant harm' is being caused or there is a significant possibility of such harm being caused; or

(b) Significant pollution of controlled waters is being caused, or there is a significant possibility of such pollution being caused.'

10.2.6 Significant harm is defined in the guidance according to risk-based criteria and must be the result of pollutant linkages.

10.2.7 A source, pathway and receptor must be present to complete the pollutant linkage and for a potentially significant risk to exist. As such, the presence of contamination in itself does not necessarily indicate a need for remedial action. Accordingly, a site can only be considered 'contaminated' when a risk to the environment or human health is present due to the presence of a 'source-pathway-receptor' linkage. In such circumstances and where there is a significant risk posed to human health and/or the environment, the above Act states that local planning authorities must adopt a 'suitable for use' approach. This means that the approach to remediating a site is dictated by the site's proposed end use.

The Contaminated Land (England) Regulations 2006 (as amended 2012)

10.2.8 As set out above, these regulations make provisions for a contaminated land regime, in accordance with Part IIA of the EPA 1990, which includes actions for the remediation of such land. These regulations (and the accompanying 2012 statutory guidance (Defra, 2012) introduced

a four category test which is intended to clarify when land does, and does not, need to be remediated.

Environmental Damage (Prevention and Remediation) (England) Regulations 2015 (as amended 2019)

10.2.9 The aim of the Environmental Damage Regulations is to prevent and remedy damage to land, water and biodiversity.

Water Supply (Water Quality) Regulations 2016 (as amended 2018)

10.2.10 The Water Supply Regulations set out measures to protect the quality of water intended for human consumption.

Environmental Permitting (England and Wales) Regulations 2016 (as amended (EU Exit) 2019)

10.2.11 These regulations update the Environmental Permitting (England and Wales) Regulations 2010 and incorporate the requirements of the Groundwater (England and Wales) Regulations 2009. These regulations control groundwater pollution, including from contaminated land sources.

Water Environment (Water Framework Directive) Regulations 2017

10.2.12 These regulations were prepared to implement the European Water Framework Directive in the UK. Although the Directive no longer has effect, the regulations remain in place to control groundwater pollution and contaminated land.

The Control of Pollution (Oil Storage) (England) Regulations 2001

10.2.13 These regulations set minimum design standards for new and existing above ground oil storage facilities.

Planning Policy Context

National Policy Statements

10.2.14 The Airports National Policy Statement (NPS) (Department for Transport, 2018), although primarily provided in relation to a new runway at Heathrow Airport, remains a relevant consideration for other applications for airport infrastructure in London and the south east of England.

10.2.15 The NPS for National Networks (Department for Transport, 2015) sets out the need for development of road, rail and strategic rail freight interchange projects on the national networks and the policy against which decisions on major road and rail projects will be made. This has been taken into account in relation to the highway improvements proposed as part of the Project[1].

10.2.16 Table 10.2.1 provides a summary of the relevant requirements of these NPSs and how these are addressed within the PEIR.

[1] It is noted that the Transport Decarbonisation Plan published by the Department for Transport (DfT) on 14 July 2021 announced DfT's intention to review the National Networks NPS in due course once demand patterns post-pandemic become clearer. It is understood DfT intend to commence the review by the end of 2021 and complete it by Spring 2023. In the interim and whilst the review is undertaken, DfT have confirmed the NPS remains relevant government policy and has full force and effect for the purposes of the Planning Act 2008.

Table 10.2.1: Summary of NPS Information Relevant to this Chapter

Summary of NPS requirement	How and where considered in the PEIR
Geology	
Where the development is subject to EIA the applicant should ensure that the Environmental Statement clearly sets out the effects on internationally, nationally and locally designated sites of ecological or geological conservation importance (paragraph 5.89 Airports NPS, paragraph 5.22 National Networks NPS).	No geological Sites of Special Scientific Interest (SSSIs) or Local Geological Sites (LGSs) are located within 500 metres of the Project site. Therefore, designated sites of geological conservation importance are proposed to be assessed further within the EIA process, as set out in Table 10.4.2. Biodiversity is considered in Chapter 9: Ecology and Nature Conservation.
The applicant should show how the Project has taken advantage of opportunities to conserve and enhance biodiversity and geological conservation interests (paragraph 5.91 Airports NPS, paragraph 5.23 National Networks NPS).	
Contamination	
For developments where land may be affected by contamination, or existing mitigation is in place in respect of historic contamination, the applicant should have regard to the statutory regime contained in Part IIA of the EPA 1990 (paragraph 5.116 Airports NPS).	A Preliminary Risk Assessment is presented as Appendix 10.9.1 and addresses the risks from historical contamination. This has been used to inform the assessment within Section 10.9 of this chapter. Impacts on water resources and physical characteristics of water are considered in Chapter 11: Water Environment.
Developments should be on previously developed (brownfield) sites provided that it is not of high environmental value. For developments on previously developed land, applicants should ensure that they have considered the risk posed by land contamination and how it is proposed to address this (paragraph 5.168 National Networks NPS).	
Where a development is subject to EIA and the development is likely to have significant adverse effects on the water environment, the applicant should ascertain the existing status of, and carry out an assessment of, the impacts of the proposed project on water quality, water resources and physical characteristics (paragraph 5.175 Airports NPS, paragraph 5.221 National Networks NPS).	
Minerals	
The applicant should safeguard any mineral resources on the proposed site for the preferred scheme as far as possible (paragraph 5.117 Airports NPS, paragraph 5.169 National Networks NPS).	Mineral resources underlying the site have been identified and reported in the Baseline Environment section (Section 10.6). In areas where there may be a loss of mineral resources, appropriate mitigation measures have been identified in Section 10.8.
The applicant must put forward appropriate mitigation measures to safeguard mineral resources (paragraph 5.121 Airports NPS, paragraph 5.182 National Networks NPS).	

Summary of NPS requirement	How and where considered in the PEIR
Land Instability	
If land stability could be an issue, the applicant should assess the likely consequences of proposed developments on sites where subsidence, landslides and ground compression is known or suspected (paragraph 5.227 Airports NPS, paragraph 5.117 National Networks NPS).	Potential ground instability risks have been reviewed and are discussed in the Baseline Environment section (Section 10.6) with mitigation provided in Table 10.8.1. .
A preliminary assessment of ground instability should be carried out (paragraph 5.228 Airports NPS, paragraph 5.118 National Networks NPS).	

National Planning Policy Framework

10.2.17 The National Planning Policy Framework (NPPF) (Ministry of Housing, Community and Local Government, 2021) sets out the planning policies for England with those relevant to this chapter summarised below.

Conserving and Enhancing the Natural Environment

10.2.18 Paragraph 174 of the NPPF states that planning policies and decisions should contribute to and enhance the natural and local environment by:

- preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of pollution including soil and water or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality; and
- remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate.

10.2.19 Furthermore, paragraph 183 requires that planning policies and decisions ensure that:

- a site is suitable for its proposed use taking account of ground conditions and any risks arising from land instability and contamination;
- after remediation, land should not be capable of being determined as contaminated land under Part IIA of the EPA 1990; and
- adequate site investigation information is available to inform the assessments.

Facilitating the Sustainable Use of Minerals

10.2.20 Paragraph 210 of the NPPF states that planning policies should:

- safeguard mineral resources by defining Mineral Safeguarding Areas; and
- adopt appropriate policies so that known locations of specific mineral resources of local and national importance are not sterilised by non-mineral development where this should be avoided.

10.2.21 The National Planning Practice Guidance (NPPG) (Ministry of Housing, Communities and Local Government, 2019) supports the NPPF and provides guidance across a range of topic areas. The NPPG includes guidance on the following topics relevant to this chapter:

- land affected by contamination;
- land stability;
- minerals;
- natural environment; and
- water supply, wastewater and water quality.

Local Planning Policy

10.2.22 Gatwick Airport lies within the administrative area of Crawley Borough Council and is adjacent to the boundaries of Mole Valley District Council to the north west, Reigate and Banstead Borough Council to the north east and Horsham District Council to the south west. The administrative area of Tandridge District Council is located approximately 1.9 km to the east of Gatwick Airport, while Mid Sussex District Council lies approximately 2 km to the south east. Gatwick Airport is located within the county of West Sussex and is immediately adjacent to the bordering county of Surrey.

10.2.23 The relevant local planning policies applicable to geology and ground conditions based on the extent of the study area for this assessment are summarised in Table 10.2.2 and explained further in the paragraphs below.

Table 10.2.2: Local Planning Policy

Administrative Area	Plan	Policy
Adopted Policy		
Crawley	Crawley 2030: Crawley Borough Local Plan 2015-2030 (2015)	ENV10 Pollution Management and Land Contamination
Horsham	Horsham District Planning Framework (2015)	Policy 24 Environmental Protection
Reigate and Banstead	Reigate and Banstead Local Plan: Core Strategy (2014)	CS10 Sustainable Development
	Reigate and Banstead Local Plan Development Management Plan 2018-2027 (2019)	NHE2 Protecting and Enhancing Biodiversity and Areas of Geological Importance DES8 Construction Management DES9 Pollution & Contaminated Land
Mole Valley	Mole Valley Core Strategy (2009)	CS15 Biodiversity & Geological Conservation
	Mole Valley Local Plan (2000)	ENV16 Regionally Important Geological/Geomorphological Sites
Tandridge	Tandridge District Core Strategy (2008)	CSP15 Environmental Quality
	Tandridge Local Plan Part 2: Detailed Policies 2014-2029 (2014)	DP19 Biodiversity, Geological Conservation & Green Infrastructure DP21 Sustainable Water Management DP22 Minimising Contamination, Hazards & Pollution

Administrative Area	Plan	Policy
Surrey	Surrey Minerals Plan Core Strategy (2011)	MC1 Spatial Strategy – Location of Mineral Development in Surrey MC4 Efficient Use of Mineral Resources MC6 Safeguarding, mineral resources and development
West Sussex	West Sussex Joint Minerals Local Plan 2033 (2021)	M9 Safeguarding minerals
Emerging Policy		
Crawley	Draft Crawley Borough Local Plan 2021-2037 (2021)	EP3 Land Quality
Tandridge	Our Local Plan 2033 (Regulation 22 Submission) (2019)	TLP46 Pollution & Air Quality
Mole Valley	Future Mole Valley 2018-2033 (Consultation Draft Local Plan) (2020)	EN10 Regionally Important Geological and Geomorphological Sites EN13 Promoting Environmental Quality EN14 Responding to Climate Emergency
Horsham	Draft Horsham District Local Plan 2019-2036 (2020)	Policy 25 Environmental Protection Strategic Policy 27 The Natural Environment and Landscape Character

10.2.24 Guidance in the West Sussex Joint Minerals Local Plan (West Sussex Council and South Downs National Park Authority, 2018) indicates that non-mineral development within a mineral safeguarded area should not be permitted unless:

- mineral sterilisation will not occur;
- it is appropriate to extract the mineral prior to the development taking place; or
- the overriding need for the development outweighs the safeguarding of the mineral and it has been demonstrated that prior extraction is not practicable or environmentally feasible.

10.2.25 Pre-application discussions are encouraged to ensure that minerals safeguarding is considered at the earliest opportunity.

10.3. Consultation and Engagement

10.3.1 In September 2019, GAL submitted a Scoping Report (GAL, 2019) to the Planning Inspectorate, which described the scope and methodology for the technical studies being undertaken to provide an assessment of any likely significant effects and, where necessary, to determine suitable mitigation measures for the construction and operational phases of the Project. It also described those topics or sub-topics which are proposed to be scoped out of the EIA process and provided justification as to why the Project would not have the potential to give rise to significant environmental effects in these areas.

10.3.2 Following consultation with the statutory bodies, the Planning Inspectorate (on behalf of the Secretary of State) provided a Scoping Opinion on 11 October 2019 (Planning Inspectorate, 2019).

10.3.3 Key issues raised during the scoping process specific to geology and ground conditions are listed in Table 10.3.1, together with details of how these issues have been addressed within the PEIR.

Table 10.3.1: Summary of Scoping Responses

Details	How/where addressed in PEIR
The Scoping Report omits potential impacts in terms of loss, destruction and excavation/storage of soils during construction of the Proposed Development. The ES should include an assessment of such impacts where significant effects are likely to occur.	Effects on agricultural soils are addressed within Chapter 18: Agricultural Land Use and Recreation. Impacts and mitigation in terms of soil loss and handling during construction are presented in Sections 10.8 and 10.9, where relevant to contamination.
The ES should include an assessment of the likely significant effects on nearby sensitive receptors including the public from the removal of any potential contaminants from the site, and quantification of the potential volumes involved (making worst case assumptions where required). This should also be framed in the context of the potential location and capacity of waste disposal infrastructure to handle such wastes, and cross reference will need to be made to relevant assumptions in relation to traffic generation and any consequential effects.	It is the intention of the Project to maximise the reuse of materials and minimize the amount of material sent for off-site disposal. The cut/fill balance will be further considered throughout the Project design and EIA process, and will be reported within Chapter 5: Project Description and in the Waste Strategy for the ES. The Waste Strategy will provide details on likely waste disposal volumes and the capacity of existing infrastructure in tandem with the Transport Assessment and Remediation Strategy. A draft Waste Strategy is provided in Appendix 5.3.2. The Remediation Strategy will provide details of procedures to be adopted during construction, which will include any measures required to protect members of the public, together with the relevant documentation to be provided by the Remediation Contractor. This will be implemented through the Code of Construction Practice (CoCP).

10.3.4 Key issues raised during consultation and engagement with interested parties specific to geology and ground conditions are listed in Table 10.3.2, together with details of how these issues have been addressed within the PEIR.

Table 10.3.2: Summary of Consultation

Consultee	Date	Details	How/where addressed in PEIR
Local Authorities (via Land Based Topics Working Group)	20/08/2019	Discussion on the potential effects on land-based resources arising from the Project and the proposed measures to mitigate these effects.	Mitigation measures relevant to this topic are set out in Section 10.8 and the assessment of potential effects on geology and ground conditions during the construction and operational phases of the Project is set out in Section 10.9.

10.4. Assessment Methodology

Relevant Guidance

10.4.1 The assessment has had due regard to the following guidance, which provides the technical framework for applying a risk management process when dealing with land affected by contamination:

- British Standard BS 10175 Investigation of Potentially Contaminated Sites (BSI, 2011 and amended 2017);
- British Standard requirements for the 'Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings' (BS8485:2015+A1:2019) (BSI, 2015);
- Construction Industry Research and Information Association (CIRIA) Document C665: Assessing Risks Posed by Hazardous Ground Gases to Buildings (CIRIA, 2007);
- Defra Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance (Defra, 2012);
- CIRIA Document C552 – Contaminated Land Risk Assessment: A Guide to Good Practice (CIRIA, 2001a);
- CIRIA Document C532 – Control of Water Pollution from Construction Sites: Guidance for Consultants and Contractors (CIRIA, 2001b);
- CIRIA Document C681 – Unexploded Ordnance (UXO): A guide for the construction industry (CIRIA, 2009); and
- Land Contamination: Risk Management (LCRM) (Environment Agency, 2020).

10.4.2 The framework presented in LCRM (Environment Agency, 2020) forms the basis of the risk assessment approach adopted in this chapter.

Scope of the Assessment

10.4.3 The scope of this PEIR has been developed in consultation with relevant statutory and non-statutory consultees, as detailed in Table 10.3.1 and Table 10.3.2.

10.4.4 A desk based Preliminary Risk Assessment (Appendix 10.9.1) has been undertaken which informs this geology and ground conditions chapter.

10.4.5 The assessment includes an evaluation of ground conditions and the nature of any potential contamination present. Part of the assessment includes a review of existing ground investigation data pertaining to the Project site from which a generic quantitative risk assessment has been

carried out in accordance with current guidance and best practice. Chemical analytical data, where available, has been compared to published assessment criteria and exceedances identified.

10.4.6 An outline conceptual site model (CSM) for the Project site as a whole has been developed as part of the Preliminary Risk Assessment to identify potential source-pathway-receptor pollutant linkages on the basis of the site reconnaissance and desk study. This outline CSM has been considered within the context of any pre-existing site investigation data and the proposal for each element of the Project. Where the CSM identifies a potential for significant harm to sensitive receptors through active pollutant linkages, further investigation or more detailed risk assessment may be required or, if residual risk remains, remediation or mitigation measures may be appropriate.

10.4.7 The scope of any intrusive investigation will be discussed and agreed in advance with the Environment Agency and Crawley Borough Council prior to undertaking the investigation.

10.4.8 A minerals resource assessment will be undertaken following consultation with West Sussex County Council (as the minerals planning authority) to explain how the Project has addressed the minerals safeguarding policy in the Joint Minerals Local Plan (West Sussex County Council and South Downs National Park Authority, 2018). The minerals resource assessment will be submitted with the ES.

10.4.9 Taking into account the scoping and consultation process, Table 10.4.1 summarises the issues considered as part of this assessment.

Table 10.4.1: Issues Considered within the Assessment

Activity	Potential Effects
Construction Phase (including Demolition): Geology and Ground Conditions	
Construction and demolition activities	Runoff from construction areas to soils (and subsequent leaching into groundwater, including effects on any private water supplies if present). Contamination risk to construction workers, including dermal contact and ingestion; or inhalation of any accumulated ground gases. Contamination risk to public, eg airborne migration and subsequent dermal contact and ingestion.
Construction of updated highways junctions	Runoff from construction areas to soils and subsequent leaching into groundwater, including effects on any private water supplies if present. Contamination risk to construction workers including dermal contact and ingestion; or inhalation of accumulated ground gases. Contamination risk to public, eg airborne migration and subsequent dermal contact and ingestion.
Use of construction compounds and creation of mitigation areas	Runoff from construction areas to soils and subsequent leaching into groundwater, including effects on any private water supplies if present. Contamination risk to construction workers including dermal contact and ingestion; or inhalation of accumulated ground gases.

Activity	Potential Effects
	Contamination risk to public eg airborne migration and subsequent dermal contact and ingestion. Loss of mineral resources.
Operational Phase: Geology and Ground Conditions	
Use of airport, including upgraded highway junctions	Contamination risk from spillages during re-fueling operations/fuel storage leakage/spills etc. Contamination risk to airport workers. Contamination risk to public and local public water supply.

10.4.10 Effects on groundwater resources (eg effects on groundwater availability/flow) are not included within this chapter but are considered within Chapter 11: Water Environment.

10.4.11 Effects which are not considered likely to be significant have been scoped out of the assessment. A summary of the effects scoped out are presented in Table 10.4.2.

Table 10.4.2: Issues Scoped Out of the Assessment

Issue	Justification
Effects on designated geological sites	There are no geological SSSIs or LGSs within 1 km of the Project site. Therefore, no effects are likely and no further assessment is provided.

Study Area

10.4.12 The study area includes the Project site and an additional buffer of up to 500 metres. This is considered sufficient to enable the identification of off-site potential sources of contaminants of concern, other factors which may have influenced site conditions and/or sensitive off-site receptors that require consideration.

Methodology for Baseline Studies

Desk Study

10.4.13 Information on geology, hydrogeology and ground conditions was collected through a detailed desk review of existing studies and datasets as summarised below:

- British Geological Survey, Geology of Britain Viewer (website: http://mapapps.bgs.ac.uk/geologyofbritian/home.html);
- Geological Survey of England and Wales, Sheet 302 Horsham, 1:50,000 scale;
- Groundsure GeoInsight Report (geological and hydrogeological information provided by the British Geological Survey (BGS) and Environment Agency);
- Groundsure EnviroInsight Report (landfills and other contaminative land use information provided by the Environment Agency, local planning authorities and the BGS);
- Groundsure EnviroInsight Report (historical mapping);
- previous geo-environmental investigation and assessment reports (summary provided within Annex 3 of Appendix 10.9.1); and

- Sussex Geodiversity Partnership Records.

Site-Specific Surveys

10.4.14 A site walkover was undertaken in September 2019 by an experienced environmental consultant. The purpose of the walkover was to ground truth the information collected from the desk review and to identify any existing sources of potential contamination. The findings of the walkover are presented within Annex 2 of Appendix 10.9.1.

Assessment Criteria and Assignment of Significance

10.4.15 The significance of an effect is determined based on the sensitivity of a receptor and the magnitude of an impact. This section describes the criteria applied in this chapter to characterise the sensitivity of receptors and magnitude of potential impacts. The terms used to define magnitude and sensitivity are based on, and have been adapted from, those used in the Design Manual for Roads and Bridges (DMRB) methodology (Highways England *et al*., 2020a), which is described in further detail in Chapter 6: Approach to Environmental Assessment.

Receptor Sensitivity/Value

10.4.16 The first step in undertaking the assessment is to identify the value (sensitivity) of the receptor affected by the Project. This has been informed by the descriptors of value described in LA104 (Environmental Assessment and Monitoring) (Highways England *et al.,* 2020a), LA 109 (Geology and Soils (Highways England *et al.,* 2019) and LA 113 (Road Drainage and the Water Environment) (Highways England *et al.,* 2020b) of the DMRB, as shown in Table 10.4.3.

Table 10.4.3: Sensitivity Criteria

Sensitivity	Definition
Very High	**Soils (superficial geology/topsoil and subsoils):** Soils supporting an EU designated site (eg Special Area of Conservation (SAC), Special Protection Area (SPA), Ramsar site). **Hydrogeology (aquifers):** Principal aquifer providing a regionally important resource and/or supporting a site protected under EC or UK legislation. Groundwater locally supports groundwater dependent terrestrial ecosystems (GWDTE)). SPZ1. **Surface water:** Watercourse having a WFD classification in a River Basin Management Plan (RBMP) and Q_{95} ≥ 1.0 m^3/s. Site protected/designated under EC or UK legislation (SAC, SPA, SSSI, Ramsar site, salmonid water). **Contamination:** Human health: very high sensitivity land use scenario eg residential or allotments. **Unexploded Ordnance (UXO):** Human health.

Sensitivity	Definition
High	**Soils (superficial geology/topsoil and subsoils):** Soils directly supporting a UK designated site (eg SSSI). **Hydrogeology (aquifers):** Principal aquifer providing a locally important resource or supporting a river ecosystem. Groundwater locally supports a GWDTE. SPZ2. **Surface water:** Watercourse having a WFD classification in a River Basin Management Plan (RBMP) and Q_{95} < 1.0 m^3/s. Site protected under EC or UK legislation. **Contamination:** Human health: high sensitivity land use such as public open space or construction workers.
Medium	**Soils (superficial geology/topsoils and subsoils):** Soils supporting non-statutory designated sites (eg Local Nature Reserves, Site of Nature Conservation Importance, mineral safeguarded area) **Hydrogeology (aquifers):** Aquifer providing water for agricultural or industrial use with limited connection to surface water. SPZ3. **Surface water:** Watercourses not having a WFD classification in a RBMP and Q_{95} > 0.001 m^3/s. Site protected under EC or UK legislation. **Contamination:** Human health: medium sensitivity land use such as commercial or industrial.
Low	**Soils (superficial geology/topsoils and subsoils):** Soils supporting non-designated notable or priority habitats. **Hydrogeology (aquifers):** Unproductive strata. **Surface water:** Watercourses not having a WFD classification in a RBMP and Q_{95} ≤ 0.001 m^3/s. **Contamination:** Human health: low sensitivity land use such as highways and rail.
Negligible	**Soils (superficial geology/topsoils and subsoils):** Previously developed land formerly in 'hard uses' with little potential to return to agriculture. **Contamination:** Human health: undeveloped surplus land/no sensitive land use proposed.

Magnitude of Impact

10.4.17 The impacts of the Project have been described using the five-point scale outlined in Table 10.4.4. These follow the general guidance set out in LA104 (Environmental Assessment and Monitoring) (Highways England *et al.,* 2020a), LA 109 (Geology and Soils (Highways England *et al.,* 2019) and LA 113 (Road Drainage and the Water Environment) (Highways England *et al.,* 2020b) of the DMRB and are also informed by CIRIA C552 (CIRIA, 2001a) and by LCRM (Environment Agency, 2020).

Table 10.4.4: Impact Magnitude Criteria

Magnitude of Impact	Definition
High	**Soils (superficial geology/topsoils and subsoils):** Physical removal or permanent sealing of soil resource. **Surface water** Loss of regionally important public water supply. Loss or extensive change to a designated nature conservation site. Reduction in water body WFD classification (adverse). **Hydrogeology (aquifers):** Loss of, or extensive change to, an aquifer. Loss of regionally important water supply. Loss of, or extensive damage to GWDTE or baseflow contribution to protected surface water bodies. Reduction in water body WFD classification (adverse). **Contamination:** Human health: significant contamination identified. Contamination levels significantly exceed background levels and relevant screening criteria with potential for significant harm to human health. Contamination heavily restricts future use of land (adverse).
	Highly beneficial impact on hydrogeological environment/soils resource of the area eg removal of existing polluting discharge to watercourse or aquifer, or removing the likelihood of pollution discharges occurring to a watercourse or aquifer, improvement in water body WFD classification (beneficial).
Medium	**Soils (superficial geology/topsoils and subsoils):** Permanent loss/reduction of one or more soil function(s) and restriction to current or approved future use (eg through degradation, compaction, erosion of soil resources) (adverse). **Surface water:** Degradation of regionally important public water supply or loss of major commercial/industrial/agricultural supplies. Contribution to reduction in water body WFD classification (adverse). **Hydrogeology (aquifers):** Partial loss or change to an aquifer. Partial loss of the integrity of GWDTE. Contribution to reduction in water body WFD classification (adverse). **Contamination:** Human health: contaminant concentrations exceed background levels and are in line with limits of relevant screening criteria. Significant contamination can be present. Control/remediation measures are required to reduce risks to human health/make land suitable for intended use (adverse).
	Moderate benefit to the hydrogeological environment/soils resource of the area (eg the Project results in a brownfield contaminated site that is or is likely to be determined as contaminated land being remediated, contribution to improvement in water body WFD classification, support to significant improvements in damaged GWDTE (beneficial).

Magnitude of Impact	Definition
Low	**Soils (superficial geology/topsoils and subsoils):** Temporary loss/reduction of one or more soil function(s) and restriction to current or approved future use (eg through degradation, compaction, erosion of soil resource) (adverse). **Surface water:** Minor effects on water supplies (adverse). **Hydrogeology (aquifers):** Minor effects on the aquifer, GWTEs, abstractions and structures (adverse). **Contamination:** Human health: contaminant concentrations are below relevant screening criteria. Significant contamination is unlikely with a low risk to human health. Best practice measures can be required to minimise risks to human health (adverse).
	Minor benefit to the hydrogeological environment/soils resource (beneficial).
Negligible	**Soils (Superficial geology/topsoils and subsoils):** No discernible loss/reduction of soil function(s) that restrict current or approved future use (adverse). **Controlled Waters (aquifers/surface water):** Results in effect on surface water or groundwater but is of insufficient magnitude to affect the use or integrity (eg no measurable impact upon groundwater receptors) (adverse). **Contamination:** Human health: contaminant concentrations substantially below levels outline in relevant screening criteria. No requirements for control measures to reduce the risks to human health/make land suitable for intended use (adverse).
	The Project would be of minor benefit or positive addition to local areas of soils resource, by potentially providing protection (beneficial).
No Change	**Soils (Superficial geology/topsoils and subsoils):** No loss/reduction of soil function(s) that restrict current or approved future use. **Contamination:** Human health: reported contaminant concentrations below background levels. **Controlled Waters (aquifers/surface water):** No loss or alteration of characteristics, features or elements; no observable impact in either direction.

Significance of Effect

10.4.18 The significance of the effect upon geology and ground conditions has been determined by taking into account the sensitivity of the receptor and the magnitude of the impact. The method employed for this assessment is presented in Table 10.4.5. Where a range of significance levels is presented, the final assessment for each effect is based upon professional judgement.

10.4.19 In all cases, the evaluation of receptor sensitivity, impact magnitude and significance of effect has been informed by professional judgement and is underpinned by narrative to explain the conclusions reached. For the purpose of this assessment, any effects with a significance level of minor or less are not considered to be significant in terms of the EIA Regulations.

Table 10.4.5: Assessment Matrix

Sensitivity	Magnitude of Impact				
	No Change	Negligible	Low	Medium	High
Negligible	No change	Negligible	Negligible or Minor	Negligible or Minor	Minor
Low	No change	Negligible or Minor	Negligible or Minor	Minor	Minor or Moderate
Medium	No change	Negligible or Minor	Minor	Moderate	Moderate or Major
High	No change	Minor	Minor or Moderate	Moderate or Major	Major or Substantial
Very High	No change	Minor	Moderate or Major	Major or Substantial	Substantial

10.4.20 A description of the significance levels is provided in the bullets below:

- Substantial: Only adverse effects are normally assigned this level of significance. They represent key factors in the decision-making process. These effects are generally, but not exclusively, associated with sites or features of international, national or regional importance that are likely to suffer a most damaging impact and loss of resource integrity. However, a major change in a site or feature of local importance may also enter this category.
- Major: These beneficial or adverse effects are considered to be very important considerations and are likely to be material in the decision-making process.
- Moderate: These beneficial or adverse effects may be important but are not likely to be key decision-making factors. The cumulative effects of such factors may influence decision-making if they lead to an increase in the overall adverse effect on a particular resource or receptor.
- Minor: These beneficial or adverse effects may be raised as local factors. They are unlikely to be critical in the decision-making process but are important in enhancing the subsequent design of the Project.
- Negligible: No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

10.5. Assumptions and Limitations of the Assessment

10.5.1 The baseline information presented in this PEIR is based on information collated as part of the desk study and consultation process and assessed within the Preliminary Risk Assessment *(*Appendix 10.9.1). Further ground investigation may be required in some cases. Where considered necessary, this may include limited environmental sampling of soil, groundwater and ground gas to verify risks identified in the Preliminary Risk Assessment as well as to inform detailed design.

10.5.2 The limitations of the Preliminary Risk Assessment are set out in Annex 1 of Appendix 10.9.1. No assumptions or limitations have been identified in the preparation of this chapter with regard to geology and ground conditions that would prevent a preliminary assessment of the potential effects being made.

10.6. Baseline Environment

Current Baseline Conditions

10.6.1 Baseline conditions for geology and ground conditions are presented below.

Site History

10.6.2 A summary of the site history is provided in Table 10.6.1.

Table 10.6.1: Site History

Date	Description
From 1870	The site comprised numerous fields bound by trees and hedgerows with wooded areas. A number of farms were present across the site. Charlwood Park was present in the north of the Project site. Several rivers and tributaries ran across the Project site. Fragments of Roman pottery were indicated to have been found in the south east and central regions of the Project site. A large 'Fish Pond' was indicated in the northern part of the Project site. An engine tower and gasometer were indicated to the north of Timberham Lodge and south of the Fish Pond. The London, Brighton and South Coast Railway ran north to south through the central part of the site where Gatwick Station is identified.
From 1879	An unnamed road bisected the site, orientated approximately north to south. A nursery was present in the south west of the site in 1895.
By 1896	Gatwick Race Course constructed in the north east, with orchards indicated in the south east.
By 1913 to 1920s	Gatwick Race Course was now labelled as a golf course and residential dwellings were now present along the unnamed road. By 1914, a number of cottages and a wind pump were indicated across Westfield Common in the south west of the site. Between 1914 and 1919, numerous additional tracks were indicated along the rail line through the centre of the site.
1930s to 1940s	The Project site had predominantly been developed as an aerodrome. By 1946, numerous possible drains and/or ditches were indicated across the west of the Project site.
1950s	Major airport development had occurred by this time. However, no significant development was indicated in the east of the site.
From 1960s	Various industrial and commercial land uses were indicated around the airport including 'Works' (Crawley Sewage Treatment Works). Crawter's Brook and the River Mole were indicated to have been partially culverted under the airport development. The course of Crawter's Brook was indicated to have been diverted by approximately 1965. Several farms across Westfield Common were no longer indicated, with both the northern and main runways partially occupying this area. Gatwick Golf Course was indicated to have been expanded. Gatwick Rail Station had been renamed Gatwick Airport Station by 1961 and the A23 and A217 were first shown at this time. The central southern portion of the Project site was labelled as Gatwick Airport between 1961 and 1963.
From 1970s	Further development of the airport had occurred. The runways had been extended across Westfield Common and the traffic control tower was now indicated. The extensive drainage and balancing pond network, and embankments were indicated to be present from around 1973. Between 1973 and 1978, a Timber Yard was indicated in the south east corner of the Project site along with a Greyhound Training Track. By 1976, the M23, roundabouts and car parks have been constructed to the east of the Project site with embankments either side. The M23

Date	Description
	was indicated running westerly from the east into the A23. Main roads had been constructed into the north east and central area of the Project site by around 1976. Further car parks and a large balancing pond were indicated to be present alongside the River Mole in the north east of the Project site. The London Road (A217) had become more established in the 1970s. By 1977, the Fish Pond in the north of the site was no longer identified as present (potentially infilled).
From 1980s	Land drains were indicated to divert into a surface water feature in the north, and embankments had been constructed south of Charlwood Road, and along the eastern edge of the River Mole. By 1989, the surface water feature in the north, adjacent to Charlwood Park Farmhouse, had been potentially infilled and developed with several car parks. An electrical substation was indicated in the west of the Project site along with possible bunded areas (likely associated with the fire training area). The eastern most roundabout (named Airport Way Roundabout East) and several commercial buildings had been constructed, including a computer centre and a further electrical substation. Further car parking areas had been constructed in the south east. Further expansion of the airport had occurred by this time, including main access roads (Airport Way Roundabout West) and South Terminal Satellite Pier, and Fuel Depots in the north east. Large embankments were identified to the north of the North Terminal Building along with Pier 5 and ancillary buildings/areas associated with the airport. A fire station was indicated in the central southern area of the airport around 1987.
From 2000s	A reservoir bound by embankments was indicated in the south east of the Project site (adjacent to Crawley Sewage Treatment Works). Further expansion/development of the North Terminal area had occurred.

Site Reconnaissance

10.6.3 A site walkover was undertaken in September 2019, the findings of which are presented in detail within Annex 2 of Appendix 10.9.1. A summary is provided below.

10.6.4 The main Project site currently comprises the operational airport and associated infrastructure, including hotels, offices, car parks and a railway station. The airport includes two runways (the main runway and the existing northern runway) located in the southern part of the Project site. A number of car parks, commercial buildings, a hangar and a warehouse are located to the south of the runways. The land to the north west of the runways comprises a fire training ground, with undeveloped land beyond.

10.6.5 The main operational area to the north of the runways includes a number of existing aircraft hangars, aircraft stands and a maintenance area in the north west with car parking areas for long stay parking further to the north west. The central and northern areas comprise a number of taxiways and aircraft stands, a cargo centre, fire station, storage areas, a fuel farm and further car parking areas. To the north east of the runways, are further aircraft stands and taxiways, the two airport terminals and a number of offices and hotels. The airport also includes an area located to the east of the railway line and A23, which comprises a number of car parks, vehicle hire offices, hotels, office buildings, fast food restaurants and petrol filling station. The vehicle hire buildings also include maintenance facilities, car wash areas and vehicle refuelling areas.

10.6.6 A number of areas in addition to the operational airport and associated infrastructure are located within the Project site boundary. These generally comprise undeveloped areas.

Published Geological Mapping and Aquifer Classification

10.6.7 Based on BGS mapping, sheet no. 302 (1:50,000 scale), and the Environment Agency Groundwater Vulnerability mapping (1:100,000 scale), the stratigraphic sequence and aquifer classification beneath the Project site are indicated in Table 10.6.2.

Table 10.6.2: Descriptions of Geological Strata

Strata	Description and Approximate Thickness	Aquifer Classification
Alluvium	This stratum is indicated to comprise clay, silt, sand and gravel. Indicated to be present across parts of the west and north of the Project site (likely to be associated with the River Mole) and also in the east (likely to be associated with Gatwick Stream). The material is likely to be up to several metres in thickness, where present.	Secondary A Aquifer
Head Deposits	This stratum is indicated to comprise clay, silt, sand and gravel. Only indicated to be present in a small area in the centre of the Project site. Likely to be of very limited thickness, where present.	Secondary Undifferentiated Aquifer
River Terrace Deposits (River Mole)	This stratum is indicated to comprise sand and gravel and is indicated to be present across parts of the west, centre and east of the Project site. Likely to be up to several metres in thickness, where present.	Secondary A Aquifer
Weald Clay Formation	This stratum is indicated to comprise mudstone with seams of clay-ironstone in the south east and far east of the Project site. It is indicated to be absent in the far south of the site. Likely to be of significant thickness beneath the site.	Unproductive Stratum
Upper Tunbridge Wells Sand Formation	This stratum is indicated to comprise sandstone and mudstone and is only indicated to be present in the far south of the Project site. Likely to be of significant thickness.	Secondary A Aquifer

Hydrology

10.6.8 The main watercourse flowing northwards through the western part of the Project site is the River Mole. It flows from the south and is culverted under both the main runway and the existing northern runway. Upon exiting the culvert, it forms the western and northern boundary of the airport before heading north away from the airport towards Hookwood.

10.6.9 A main tributary of the River Mole is the Gatwick Stream, which flows from the south, passing west of the Crawley Sewage Treatment Works and beneath the London to Brighton railway line prior to passing northward to run between the railway and the A23 and being culverted under South Terminal. On emergence from the culvert, it flows through Riverside Garden Park to its confluence with the River Mole at the western end of the park.

10.6.10 Other tributaries of the River Mole, including Crawter's Brook, Man's Brook and Westfield Stream, Burstow Stream also flow through or close to the site.

10.6.11 The study area is located within a surface water Nitrate Vulnerable Zone (NVZ) and a surface water Safeguard Zone (SgZ). An NVZ is an area of land draining into water known to be polluted

by nitrates. A SgZ is an area that influences the water quality at water abstraction sites at risk of failing the drinking water protection objectives.

10.6.12 There are no surface water or potable water abstraction licences within the vicinity of the Project site.

Minerals

10.6.13 The West Sussex Joint Minerals Local Plan (West Sussex Council and South Downs National Park Authority, 2018) states that '*mineral resources are finite and they must be protected…..from permanent sterilisation where possible'*.

10.6.14 The Project site falls within the Brick Clay Resource Mineral Safeguarding Area. The mineral resource covers a large area of the county, with most of the resource located in the north and west (in other words, the Project site accounts for a small area of the overall Brick Clay Resource Mineral Safeguarding Area within the county). The Project site also falls within the Brick Clay Resource Consultation Area as shown in the Minerals and Waste Safeguarding Guidance (West Sussex Council and South Downs National Park Authority, 2020).

10.6.15 Clay has historically been extracted in West Sussex for the purpose of brickmaking. Wealden stock bricks continue to be produced and have a distinctive character. Clay is also used in the manufacture of tiles, pipes and cement. There are five active brickworks in West Sussex, with their own supplies of clay, which have a total permitted reserve of 18.7 million tonnes (2016 data). National policy dictates that mineral planning authorities provide for a 25 year stock of permitted reserves. Three of the active brickworks have in excess of 25 years of clay reserves, one has 24 years and the brickworks at West Hoathly has less than 10 years of reserves (2016 data). The strategy for clay (as set out in the Minerals Local Plan (West Sussex Council and South Downs National Park Authority, 2018)) is to safeguard brick-making clay; to allocate an extension to the claypit at West Hoathly brickworks and allow extensions or new sites, if existing supplies are exhausted or if a particular source of clay is required to enable appropriate blends to be made. The Project site is not located in an area that is currently used to provide clay resources for the brick works.

Environmental Information

10.6.16 Industrial land use, landfill sites and other waste facilities, and pollution incidents recorded in the vicinity of the Project site are presented in Table 10.6.3.

Table 10.6.3: Environmental Data

Environmental Data	Approx. Distance and Direction
Part A1 and IPPC Authorised Activities	
Installation Name and Detail	
Shell Hydrogen Refuelling Station – issued 2017	On site – north
Gatwick Power Station – issued 2006	On site – south
Crawley Sewage Treatment Works CHP – issued 2010	Adjacent – south east

Environmental Data	Approx. Distance and Direction
Control of Major Accident Hazards	
Name and Detail	
Shell UK Oil Products Ltd – Gatwick Fuel Farm – Upper Tier	On site – north
Registered Waste Sites	
Name and Description	
Gatwick Waste CARE Centre – Special Waste Transfer Station – <25,000 tonnes – issued 2010	On site – central
Austins Land – Landfill accepting Non-Biodegradable Wastes – >25,000 to <75,000 tonnes – issued 1978	On site – east
Platinum International Ltd – Metal Recycling Site – <25,000 tonnes – issued 2017	90 metres – south
Crawley Sewage Treatment Works – Landfill – <25,000 tonnes – issued 2013	Adjacent – south east
DJ Grab Services Ltd – Physical Treatment Facility – >25,000 to <75,000 tonnes – issued 2016	50 metres – north
Simmonds Donald Richard Thomas – Metal Recycling Site – <25,000 tonnes – issued 1994	140 metres – east
Jupp Peter – Treatment of waste to produce soil – <25,000 tonnes – issued 2013	280 metres – east
United Grab Hire Ltd – Physical Treatment Facility – <25,000 tonnes – issued 2013	390 metres – east
National Incidents and Records of Pollution*	
Impact Details	
Significant impact to Gatwick Stream – List 1 substance – 1999	On site – north east
Major impact to water – List 2 substance – 2001	On site – south west
Major impact to water – List 2 substance (surfactants and detergents) – 2002	On site – north
Major impact to water – List 2 substance (biodegradable material or waste) – 2018	On site – north
Major impact to water – List 2 substance (sewage materials) – 2017	On site – east
Significant impact to land and water – List 2 substance (oil or fuel) – 2014	20 metres – south
Significant impact to water – List 2 substance (unspecified) – 2016	On site – south east
Significant impact to water – List 2 substance (gas and fuel oils) – 2002	90 metres – east
Historical Landfill Sites	
Name and Description	
Gatwick Brickworks – inert waste – 1983 to 1984	240 metres north
Blackcomer Wood – inert waste – 1976	330 metres south east

* Significant/major impacts identified only

Ground Stability

10.6.17 The site is indicated to have potential for small scale underground mining in relation to iron ore.

10.6.18 Areas at moderate risk for compressibility are present across the site, which appear to correspond to BGS mapped areas of Alluvium.

10.6.19 A moderate risk of slope instability has been identified for a small area along the A23 embankment.

Previous Ground Investigations

Introduction

10.6.20 A number of ground investigations and assessments have been undertaken across the Project site. A summary of the reports available is provided in Annex 3 of Appendix 10.9.1 and the location of the exploratory holes is shown in Figure 10.6.4.

Site-Specific Geology

Made Ground

10.6.21 Made Ground has been encountered across the majority of the Project site, averaging approximately 1 metre thickness (generally <2 metres). Localised deeper Made Ground was encountered at between 3 and 3.7 metres and up to a maximum of 6.45 metres located directly west of the North Terminal building.

10.6.22 The greatest depth of Made Ground was considered to be a result of the removal of superficial deposits associated with the original course of the Gatwick Stream during construction of Pier 5.

Superficial Deposits

10.6.23 Superficial deposits in the form of Alluvium, Head and River Terrace Deposits have been encountered across the Project site associated with former and existing watercourses. These deposits appear to have been commonly excavated to facilitate airport development.

10.6.24 The Alluvium has been recorded as up to approximately 2.9 metres in thickness, with an average thickness of approximately 1 metre. Localised layers of peat were identified within these deposits.

10.6.25 The River Terrace Deposits were reported to be up to 1.1 metres in thickness, where present.

Solid Geology

10.6.26 The Weald Clay Formation has been encountered across the Project site as part of previous investigations to a maximum depth of 35.5 metres (unproven). This comprised mudstone/siltstone with a weathered upper horizon typically comprising a stiff clay.

Site-Specific Hydrogeology

10.6.27 Shallow groundwater was generally identified between approximately 0.8 metres and 3 metres below ground level (bgl) within Made Ground, superficial deposits or weathered Weald Clay.

10.6.28 Groundwater was identified to generally be perched and discontinuous with these deposits.

Reported Evidence of Contamination

10.6.29 In 2013, a fuel leakage investigation around Pier 4 (Atkins, 2013) was undertaken due to observations of fuel impacted flood water and free phase contamination within a utilities chamber.

10.6.30 The investigation identified hydrocarbon impacted soils and groundwaters with the potential source attributed to underground fuel lines. It is not known if any remediation was completed following this investigation.

10.6.31 A 2017 ground investigation for the Boeing hangar (Arcadis, 2017; Stantec, 2017) identified loose asbestos fibres (chrysotile) within a sample of shallow Made Ground and hydrocarbon impacted perched shallow groundwater along with elevated volatile organic compounds (VOCs) in soil gas samples.

10.6.32 Activities within the firefighting area have involved the burning of pools of kerosene fuel and gas in two separate basins. Firefighting foam is used to extinguish the fires.

Soil and Groundwater Contamination Encountered as Part of Previous Investigations

10.6.33 Historical soil and groundwater data obtained as part of the previous investigations have been compared to contemporary assessment criteria, where available, and the findings (including any exceedances) are presented in Annex 3 of Appendix 10.9.1. This utilises historical ground investigation data associated with exploratory holes located within those parts of the Project site where development is proposed.

10.6.34 Contaminants of concern within soils did not exceed the assessment criteria.

10.6.35 Exceedances of assessment criteria for a number of contaminants of concern (including heavy metals, hydrocarbons and VOCs) have been identified within perched/groundwaters.

10.6.36 Additionally, leachable concentrations of heavy metals and hydrocarbons were identified. It is considered that the exceedances for hydrocarbons were generally confined to the Made Ground and were located close to the boundary of the Made Ground/underlying clay interface.

10.6.37 The results of the leachate analysis suggest that the general quality of Made Ground identified on the Project site may represent a moderate risk with regards to generation of low-quality perched groundwater.

Ground Gas Monitoring

10.6.38 Ground gas monitoring data have been identified from approximately seven previous phases of ground investigations. Elevated methane (up to approximately 32.4%), carbon dioxide (up to approximately 11%), carbon monoxide (up to approximately 313 parts per million (ppm)) and depleted oxygen have been recorded in various parts of the site together with high flows (up to 43.1 litres per hour (l/hr)).

10.6.39 Additionally, soil vapour sampling recorded elevated hydrocarbon vapours during a ground investigation for the construction of the Boeing hangar.

10.6.40 Potential sources of elevated ground gas were attributed to the infilled balancing pond at the North Terminal and a former fuel line at the South Terminal.

10.6.41 The risk of hazardous ground gas to buildings on the Project site has been assessed using the classification method set out in C665 ‘Assessing risks posed by hazardous ground gasses to buildings’ (CIRIA, 2007). The method uses both gas concentrations and borehole flow rates to define a Characteristic Situation for a site, based on the limiting gas volume flow for methane and

carbon dioxide. Characteristic Situations (CS) assigned to areas across the Project site ranged between CS1 (very low risk) and CS3 (moderate risk).

Unexploded Ordnance (UXO)

10.6.42 The risk of UXO has been reported for Gatwick Airport within a number of previous reports (Appendix 10.9.1, Annex 3) and a summary is provided below.

UXO Hazard Summary

10.6.43 The main sources of UXO hazard arise from munitions storage/disposal activities undertaken at Gatwick and in the surrounding area during and immediately after World War II. There were munitions supply depots surrounding Gatwick Airport supporting the Royal Air Force (RAF), Home Guard, Special Operations Executive and the Army prior to the D-Day invasions in 1944.

10.6.44 At the end of World War II, some of the unused munitions at the depots were disposed of locally. This included ordnance returned to the depots which were not required in combat but were primed and fused.

UXO in Made Ground

10.6.45 Post-World War II, during the extension of Gatwick Airport, significant earthworks were undertaken during construction of the airfield.

10.6.46 A large number and wide range of live ordnance was found when excavating within Made Ground across much of the airfield. There is consequently a potential for UXO to be present within the Made Ground across the airport and just outside the airfield perimeter, as proven by these post-World War II UXO finds.

10.6.47 Records of finds to date indicate that such ordnance is likely to comprise close combat munitions such as: grenades; mortars; smoke bombs; small arms ammunition; Projector, Infantry, Anti-Tank weapons (PIATs), alongside anti-tank mines and a variety of other ammunition.

10.6.48 The UXO hazard is considered to be confined to the Made Ground. However, potential for some localised munitions stores dating from World War II buried at shallow depth in the natural ground cannot be totally discounted.

Conceptual Site Model Geology and Ground Conditions Baseline Summary

10.6.49 Superficial deposits underlying the west and centre of the Project site comprise Alluvium, Head and River Terrace Deposits. They constitute Secondary A aquifers and Secondary Undifferentiated aquifers. Ground investigations have proven the depths of the deposits to be approximately 2.9 metres bgl. Groundwater has been recorded at depths of approximately 0.8 to 3 metres bgl and is associated with the Made Ground, superficial deposits and weathered layers of the Weald Clay. In most cases, it is likely to be discontinuous and perched, however, there is the potential for hydraulic continuity with the surface watercourses on the Project site. The Weald Clay bedrock has a low permeability and is classified as an unproductive stratum.

10.6.50 The River Mole is the main watercourse flowing through the Project site and is culverted under the main and northern runways. Tributaries of the River Mole, including Crawter's Brook, Gatwick Stream, Man's Brook, Burstow Stream and Westfield Stream, all flow close to or through the Project site.

10.6.51 The historic use of the site has primarily been for aerodrome/airport use, prior to which it was used as a racecourse, golf course, farmland and residential dwellings. Munition storage and disposal activities were undertaken at Gatwick and in the surrounding area during and immediately after World War II. The remaining UXO hazard is likely to be associated with areas of Made Ground, however some localised munition stores in the shallow natural ground cannot be discounted.

10.6.52 A number of potential sources of contamination have been identified from historic and current uses. A review of previous ground investigations has identified elevated levels of contaminants in the soil, groundwater and leachate. Elevated levels of methane and carbon dioxide have also been recorded in some areas.

10.6.53 Much of the Project site is covered by buildings and hard surfacing, which reduces the number of potential pathways to receptors. There are no known active pollutant linkages whilst the Project site remains in its current baseline condition and operates in accordance with existing procedures. However, a number of potential pollutant linkages may become active where areas of the Project site are proposed for development and this is considered in Section 10.9.

Future Baseline Conditions

10.6.54 The assessment of likely effects on geology and ground conditions considers any potential changes in baseline conditions that would alter the conclusions of the assessment. The primary sources of future change with respect to the baseline are changes in land use and climate change.

10.6.55 With respect to geology, hydrogeology and ground conditions there is potential for an increased risk of contamination as a result of future changes to land use. In terms of climate change there is a potential for increased leaching of contaminants from soil as a result of longer and more frequent periods of rainfall.

10.6.56 These factors have been taken into consideration, where practicable, in the assessment of effects.

Initial Construction Phase: 2024-2029

10.6.57 Over this time period, the future baseline in relation to geology and ground conditions is unlikely to significantly change from that described above. It is considered likely that in the absence of the Project, the majority of the Project site would remain in airport use or in uses supporting the airport, with surrounding areas of natural habitat/agricultural land ie no material changes to land use are envisaged in this timescale.

10.6.58 There are a number of identified future developments that would be undertaken in the absence of the Project, such as the extension to Pier 6. In accordance with the conditions of their planning consents and usual good practice, these may require site investigation and remediation to be undertaken where previous investigations have identified exceedances of screening criteria.

10.6.59 Overall, there are unlikely to be any significant changes to the geology and ground conditions described in this chapter during the period up to 2029.

10.6.60 It is unlikely that geology and ground conditions would be specifically vulnerable to the effects of climate change during this period.

2030 to 2038

10.6.61 There are unlikely to be any significant changes to the geology and ground conditions baseline described in this chapter during the period 2030-2038 as a result of the future improvements within Gatwick Airport itself, or in relation to known planning policy given that ground conditions will primarily relate to the specific development parcels within a same use setting. It is recognised that any remediation of adjacent land may remove potential off site sources of contamination. It is unlikely that geology and ground conditions would be materially vulnerable to the effects of climate change during this period.

10.7. Key Project Parameters

10.7.1 The assessment has been based on the parameters identified within Chapter 5: Project Description.

10.7.2 Table 10.7.1 identifies the key parameters relevant to this assessment. Where options exist, the maximum design scenario selected is the one having the potential to result in the greatest effect on an identified receptor or receptor group. Effects of greater adverse significance are not predicted to arise should any other option identified in Chapter 5 be taken forward in the final design of the Project.

Table 10.7.1: Maximum Design Scenarios

Potential Impact	Maximum Design Scenario	Justification
Initial Construction Phase: 2024-2029		
Area within the Project site boundary	820 hectares	This is the maximum area affected by land take or direct construction activity. It is noted that this area includes both the existing operational airport areas of previously undeveloped land.
Depth of excavation: Museum Field (flood compensation areas)	3.5 metres	Maximum potential depth of excavation and therefore maximum effect on existing ground and groundwater and maximum loss of brick clay resource from mineral safeguarding area.
Depth of excavation: Car Park X	2.5 metres	
Depth of excavation: Car Park Y	10 metres	Maximum potential depth of excavation and therefore maximum effect on existing ground and groundwater.
Depth of excavation: fire training ground	5 metres	Maximum potential tank depth and therefore maximum depth of excavation of potentially contaminated material that couldn't be managed on site.
Depth of excavation: new pumping stations	10 metres	Maximum depth in Weald Clay associated with proposed Pumping Station 2a – and therefore maximum effect on existing ground and groundwater.

Potential Impact	Maximum Design Scenario	Justification
Depth of excavation: new substations	3 metres	Maximum potential depth in Weald Clay of excavation and therefore maximum effect on existing ground and groundwater.
Depth of excavation: CARE, motor transport (Phase 1 and early works for Phase 2) and surface transport facilities	5 metres	
2030-2038		
Land take for junction improvements	South Terminal roundabout compound: 2 hectares. North Terminal roundabout contractor compound: 1.6 hectares. Longbridge roundabout satellite compound: 0.65 hectares. Highway designs as shown in Appendix 5.2.1.	Maximum construction compound areas and current highway designs identified.
Depth of excavation: Gatwick Stream Flood Compensation Area	5 metres	Maximum potential depth of excavation and therefore maximum effect on existing ground and groundwater.
Depth of excavation: Pumping Station 7a	6 metres	
Depth of excavation: new substation north of Pier 7	3 metres	
Design Year: 2038		
Parameters assumed to be as above.		

10.8. Mitigation and Enhancement Measures Adopted as Part of the Project

10.8.1 A number of measures have been designed into the Project to reduce the potential for impacts on geology and ground conditions. These are listed in Table 10.8.1. Those measures applicable to the construction phase would be implemented as part of the Code of Construction Practice (CoCP). An outline CoCP is provided at Appendix 5.3.1.

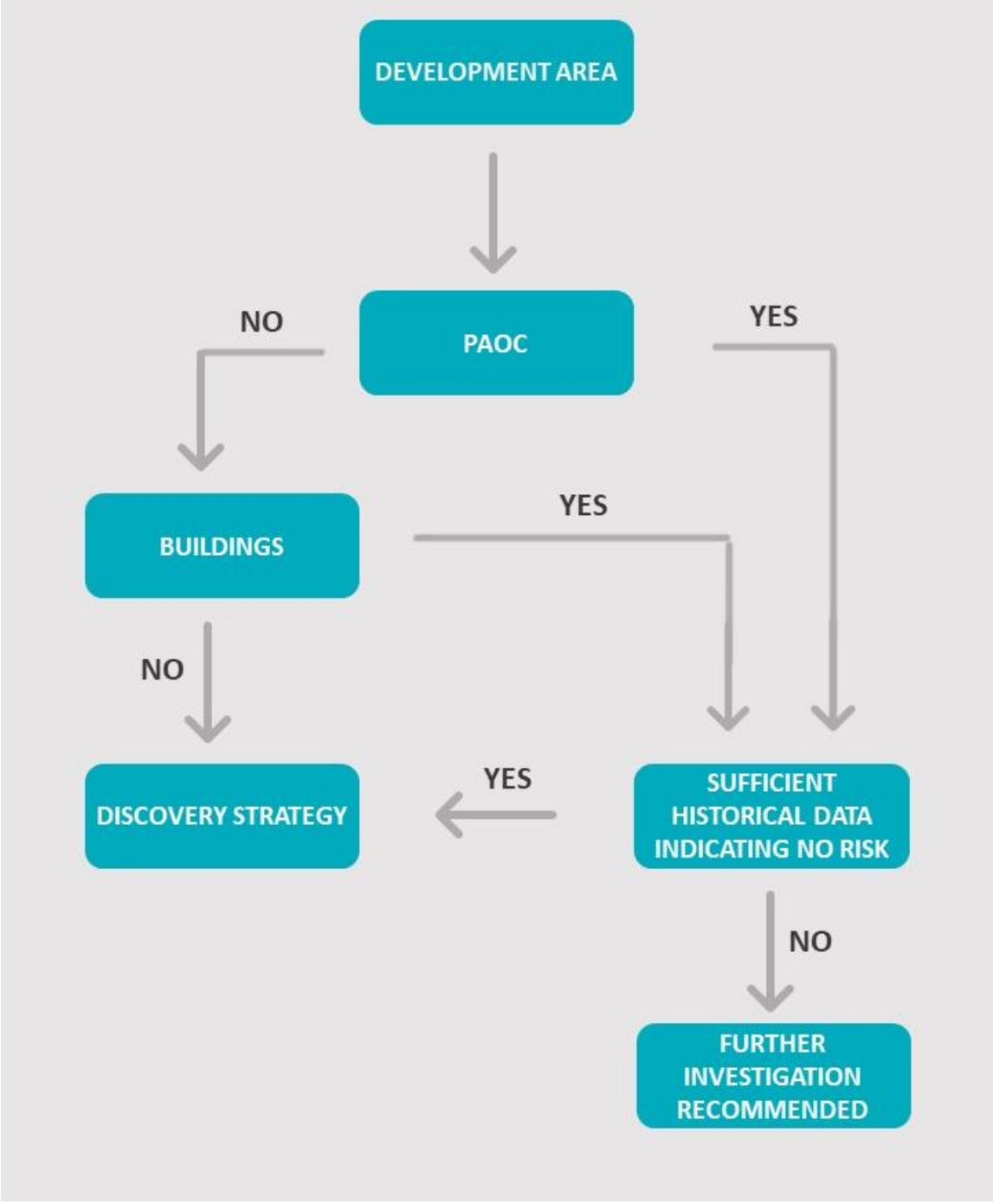
Table 10.8.1: Mitigation and Enhancement Measures

Measures Adopted as Part of the Project	Reason
Mitigation	
A structured approach would be followed to determine which development areas within the Project site require further assessment/ground investigation. The approach is set out in Diagram 10.8.1 and comprises the following elements: ▪ discovery strategy; and ▪ ground investigation. *Discovery strategy* The discovery strategy would comprise a watching brief that would be undertaken by suitably trained personnel during construction activities such as ground clearance and earthworks. The strategy would also include a procedure for construction workers to follow in the event that previously unknown contamination is discovered. *Ground investigations* Where assessment of historical data cannot demonstrate that the risk of contamination is low, intrusive ground investigations would be undertaken. The scope of the investigation would be agreed with the Environment Agency/relevant local planning authority prior to its implementation. Where appropriate, the investigations will include geotechnical testing to provide information on land stability. An appropriate slope stability assessment will be undertaken where considered necessary.	To identify where further investigations are required with regard to contaminated land.
Remediation Strategy Where the results of the ground investigation determine that remediation is required to ensure that the site is suitable for its proposed use, a remediation strategy would be prepared. The strategy would comprise the following: ▪ implementation plan setting out the objectives and requirements of the remediation; ▪ validation sampling to confirm that remediation objectives have been met; and ▪ verification report. The scope of the remediation strategy would be agreed with the Environment Agency/relevant local planning authority prior to its implementation. The verification report would also be sent to the Environment Agency/relevant local planning authority for approval. Subject to the scope and results of the Remediation Strategy, the following would be undertaken where appropriate to inform construction activities and the detailed design of buildings: ▪ piling risk assessment (in accordance with the Environment Agency guidance) including control measures (where appropriate) to mitigate risk to controlled waters during piling installation; ▪ detailed ground gas risk assessment and gas control measures during construction and to be incorporated into building design (where appropriate); and ▪ groundwater and/or surface water monitoring.	To facilitate the remediation of the site.
A Materials Management Plan would be prepared to document the management of soils on the site (including the raising of Pentagon field) and include a risk assessment procedure to demonstrate the soils do not present a risk to human health or the	To facilitate the management of soils.

Measures Adopted as Part of the Project	Reason
environment. The Materials Management Plan will be undertaken in accordance with the CL:AIRE Code of Practice (CL:AIRE, 2011).	
Ongoing consultation with West Sussex County Council Mineral Planning Authority to discuss opportunities to minimise the impacts of the Project of the Mineral Safeguarded Areas at the Project site.	To minimise the area of viable mineral resource affected by the Project.
Implementation of measures to prevent and control spillage of oil, chemicals and other potentially harmful liquids. This would ensure appropriate storage and handling of materials and products in accordance with the Control of Pollution (Oil Storage) (England) Regulations 2001, for example: ▪ avoidance of oil storage within 50 metres of a spring, well or borehole; ▪ within 10 metres of a watercourse; ▪ where oil could run over hard ground into a watercourse; ▪ secondary containment system that can hold at least 110% of the oil volume stored; and ▪ avoidance of storage of oil in areas at risk of flooding. Refuelling of machinery would be undertaken within designated areas where spillages can be easily contained. Machinery would be routinely checked to ensure it is in good working condition; and any tanks and associated pipe work containing oils and fuels would be double skinned and be provided with intermediate leak detection equipment.	To minimise ground contamination and prevent contaminated runoff entering surface water or groundwater.
Implementation of measures to protect groundwater during construction, including good environmental practices based on legal responsibilities and guidance on good environmental management in: guidance in: CIRIA C532 Control of Water Pollution from Construction Sites – Guidance for Consultants and Contractors (2001b).	To help avoid pollution incidents occurring.
Implementation of control measures, use of appropriate personal protective equipment and adoption of high levels of personal hygiene by construction workers. Health and Safety risk assessments to be completed prior to construction workers in line with Construction (Design and Management) Regulations 2015.	To mitigate risks to construction workers from contamination including ground gas.
A UXO mitigation strategy would be developed using guidance within Unexploded Ordnance: A guide for the Construction Industry (CIRIA, 2009). The strategy would utilize information from the Explosive Ordnance Threat Assessment Report (Bactec, 2013).	To mitigate risks from unidentified unexploded ordnance.
During operation, maintenance activities may involve the use of chemicals and oils. Secure storage facilities would be provided, including a secondary containment system. A spillage control procedure would be implemented to ensure that any spillages are contained and removed.	To help avoid pollution incidents occurring.
Monitoring	
The discovery strategy would include suitably trained personnel to undertake the watching brief. Groundwater and surface water monitoring may be required as part of the Remediation Strategy.	To minimise impacts to controlled waters.

Measures Adopted as Part of the Project	Reason
Enhancement	
None identified.	

Diagram 10.8.1: Strategy for Identification of Areas for Further Investigation



10.9. Assessment of Effects

Initial Construction Phase: 2024-2029

Impacts on Non-Agricultural Soil Resources

10.9.1 This phase involves the establishment of the construction compounds (excluding the Longbridge roundabout satellite contractor compound for the Longbridge roundabout improvements). The main construction compound and part of the airfield satellite contractor compound are located on land that is currently sealed by existing block paving or hard surfacing; the function of these soils is to provide a platform for man-made structures. The remainder of the airfield satellite contractor compound and the South Terminal roundabout contractor compound comprise vegetation (managed pasture) and do not comprise a notable or priority habitat. The North Terminal surface access satellite contractor compound is currently a car park (Car Park Y). The soil's function to provide a platform for man-made structures would remain unchanged in this area.

10.9.2 Construction compounds would be surfaced where existing surfacing is inadequate or absent; this would reduce the potential for erosion to occur. The temporary loss of the soil function of the airfield satellite contractor compound and the South Terminal roundabout contractor compound is considered to represent a low magnitude of impact. The soils support a managed grassland and are considered to have a low sensitivity. The level of the effect is assessed to be **negligible**, which would not be significant.

10.9.3 The magnitude of impact on soil resources for the other compounds is considered to be 'no change' and the sensitivity of the soil resource at these locations is negligible. On this basis, the level of effect is assessed as **no change**, which would not be significant.

10.9.4 This phase also involves the relocation of many existing facilities within the Project site. In most cases, the areas where facilities are to be relocated are already occupied by buildings, structures or hard surfacing. The function of these soils is to provide a platform for man-made structures. Construction activities such as breaking up of paved areas, earthworks etc. would involve exposure of the soils to rain and the movement of machinery which could lead to erosion and compaction, however, these activities would be temporary. The magnitude of impact on the soil resource is considered to be low as it would not permanently restrict the current or future use of the soil. Given that the soils are already developed, the sensitivity is considered to be negligible. On this basis, the level of effect is assessed as **negligible**, which would not be significant.

Impacts on Aquifers

10.9.5 Construction activities which involve breaking the ground surface increase the potential for existing contaminants in the soil and perched groundwater to be mobilised and migrate through the soil as a result of leaching (from exposure to rainfall) and from the creation of pathways to aquifers at depth (eg piling). There is also the potential for contaminants to occur in the soil during construction as a result of spillages or leakages.

10.9.6 The review of desk study data and the observations from the site walkover identified several potential areas of concern (PAOC) within the Project site (see Figure 10.6.3), based on the methodology set out in Appendix 10.9.1. The PAOC represent potential sources of contamination from existing and historic land uses on the Project site and off-site. Where previous site investigations have been undertaken in areas to be affected by the Project, the results have been reviewed to identify where samples of soil, groundwater and leachate exceeded relevant

screening criteria. The proposed development areas within the Project site have been overlain with the PAOC, together with the site investigation locations and results to identify the following:

- development areas that include PAOC;
- the level of existing information available for these PAOCs; and
- the potential for pollutant linkages to be active based on the existing information.

10.9.7 During the initial construction phase, several development areas identified as PAOC would be constructed. These areas include:

- main contractor compound (PAOC 6);
- relocation of the fire training ground (PAOC 15);
- relocation of Taxiway Juliet (PAOC 37 and 41);
- construction of Purple Parking at Crawter's Field (PAOC 43);
- relocation of the CARE and motor transport facilities (Phase 1 and early stages of Phase 2) (PAOC 46);
- changes to the South Terminal forecourt (PAOC 1, 2 and 4);
- clearance works for Charlie Box (PAOC 9);
- construction of a new runway exit to Taxiway Juliet (PAOC 9);
- Virgin hangar pavement works (PAOC 16 and 45);
- provision of new Pier 7 stands (PAOC 35);
- construction of the new Car Park Y surface water runoff storage area (PAOC 36); and
- construction of a South Terminal hotel (PAOC 70).

10.9.8 A staged approach is proposed as part of the mitigation strategy to identify the most appropriate course of action for each development area and to target areas where further investigation is required. The staged approach is set out in Appendix 10.9.1. Further ground investigations are proposed for each of the areas identified above and the scope of the investigations would be agreed with the Environment Agency and Crawley Borough Council prior to their commencement. The results of the investigations/further assessment would determine remediation requirements. A remediation strategy would be prepared and implemented to ensure the area is suitable for its proposed use. The scope of the remediation strategy would be agreed with the Environment Agency and Crawley Borough Council prior to its implementation. Validation works would be undertaken on completion of the remediation and a verification report prepared for regulatory sign off.

10.9.9 For development areas that do not fall within a PAOC (and where no buildings are proposed), a discovery strategy would be implemented whereby procedures are in place for construction staff to follow in the event that currently unknown contamination is encountered during construction activities.

10.9.10 Measures to minimise the potential for spillages and leakages or fuels and chemicals would be implemented through the CoCP. These measures would form part of a pollution prevention plan.

10.9.11 Taking into account the committed mitigation, the magnitude of impact on aquifers would be negligible. River Terrace Deposits are predominantly located in the centre of the Project site. These deposits are a Secondary A aquifer and are of medium sensitivity. The level of effect is assessed to be **minor adverse**, which would not be significant. Weald Clay extends across the majority of the Project site. It is classified as an unproductive stratum and has a low sensitivity. The level of effect on this receptor is considered to be **negligible**, which would not be significant.

10.9.12 The spoil strategy for the Project site estimates the following arisings will be exported off site to a suitably licenced facility:

- Car Park X – (92,000 m^3)
- Museum Field – (98,000 m^3)

10.9.13 Both these areas are not located within PAOC. Full chemical characterisation of the materials will be undertaken and assessed in line with Technical Guidance WM3 (Environment Agency, 2021) and transported and disposed of in line with full Duty of Care Regulations.

Impacts on Surface Watercourses

10.9.14 Impacts of the Project on surface water quality may arise from runoff from construction areas and also as a result of contaminants in soils or perched groundwater migrating to surface waters. These superficial deposits comprise Alluvium and the River Terrace Deposits and are located predominantly in the west and centre of the Project site associated with the surface watercourses. Construction activities in the vicinity of these superficial deposits (eg the relocation of the fire training ground and electricity substations) have the greatest potential to lead to an impact on surface water courses.

10.9.15 The staged approach as summarised in paragraph 10.9.8 would be implemented during this construction stage. The CoCP will also include measures to control surface water runoff. On this basis, the magnitude of impact is predicted to be negligible. The highest sensitivity attributed to surface waters at the Project site as presented within Chapter 11: Water Environment is high. The level of the effect is therefore assessed as **minor adverse**, which would not be significant.

Impacts on Human Health

10.9.16 Construction activities would involve breaking the ground surface and disturbing soil and perched groundwater. Potential impacts to human health may arise as a result of exposure to contaminants via dermal contact, ingestion of soil/soil derived dusts and inhalation of contaminated dusts/fibres and ground gases/vapours. There is the potential for adjacent site users to also come into contact with airborne dusts/fibres.

10.9.17 There is the potential for elevated concentrations of contaminants to exist on the Project site in the PAOCs. Following the staged approach summarised in Appendix 10.9.1, further investigation of the PAOCs listed in paragraph 10.9.7 would be undertaken. Remediation strategies would be developed where appropriate and the area remediated to ensure minimal risk to human health.

10.9.18 The sensitivity of the construction workers is considered to be high, given the potential for exposure to contaminants as part of their role/activity on site, although it would be for a temporary duration.

10.9.19 Where the further assessment/investigation has identified that remediation is required, the magnitude of impact could be medium. These areas are likely to be localised in extent. For the majority of the other development areas the magnitude of impact would be low.

10.9.20 Construction would be undertaken in accordance with specific Health and Safety risk assessments, prepared prior to construction works. In accordance with the Construction (Design and Management) Regulations 2015, construction workers would be provided with appropriate protective equipment and appropriate welfare facilities and any specific control measures would

be implemented. With this mitigation in place, the magnitude of impact would be low, and the level of effect would be **minor adverse** across the site, which would not be significant.

Impacts on Mineral Safeguarding Areas

10.9.21 The excavation of soil from the flood alleviation areas may lead to a loss of mineral resources from the Brick Clay Resource Mineral Safeguarded Area. This is considered to be a very small proportion of the total Mineral Safeguarding Area for brick clay, which extends across much of the north and east of the county.

10.9.22 The Joint Minerals Local Plan (West Sussex County Council and South Downs National Park Authority, 2018) indicates that the majority of the brickworks within the county have approximately 25 year supplies (2016 data) and do not rely on the mineral resource at the Project site.

10.9.23 The viability of using the excavated mineral as a mineral resource is dependent on the depth of overburden material, the quality of the mineral resource and the demand for the mineral at the time of the construction works. Assuming the worst case that the excavation of material from the flood compensation areas could not be used as a mineral resource, the magnitude of impact is considered to be low given the limited physical extent in the context of the safeguarding area as a whole. The sensitivity of the Brick Clay Resource Mineral Safeguarded Area is medium and therefore, the level of effect is assessed as **minor adverse**, which would not be significant. However, it is noted that opportunities to use the excavated material as a mineral would be explored.

Further Mitigation

10.9.24 As set out above, opportunities to use the material excavated from the Brick Clay Resource Mineral Safeguarded Area for mineral use would be explored nearer the time, once further details of the likely timing and nature of the material are known. No further mitigation is proposed.

Future Monitoring

10.9.25 On completion of the remediation measures and verification report, future monitoring is unlikely to be required.

Significance of Effects

10.9.26 No further mitigation or monitoring is required. Therefore, the significance of effects would remain as presented above.

2030-2032

Impacts on Non-Agricultural Soil Resources

10.9.27 This phase would include the junction improvement works alongside existing highways. These areas are considered minimal and any loss of the soil function within these areas is considered to represent a low magnitude of impact. The soils support a managed grassland and are considered to have a low sensitivity. The level of the effect is assessed to be **negligible**, which would not be significant.

10.9.28 In 2030, the construction compound for the Longbridge roundabout satellite contractor compound would be established for the Longbridge roundabout improvements. This comprises vegetation (managed pasture) and does not comprise a notable or priority habitat.

10.9.29 Construction compounds would be surfaced where existing surfacing is inadequate or absent; this would reduce the potential for erosion to occur. The temporary loss of the soil function is considered to represent a low magnitude of impact. The soils support a managed grassland and are considered to have a low sensitivity. The level of the effect is assessed to be **negligible**, which would not be significant.

10.9.30 The assessment of effects from the construction of other development areas with regard to non-agricultural soil resources would be the same as described for the initial construction phase (2024-2029).

Impacts on Aquifers

10.9.31 The remediation of many of the PAOCs identified in paragraph 10.9.7 and any areas where previously unknown contamination has been identified would be implemented and complete by this stage.

10.9.32 Between 2030 and 2032, construction activity would be ongoing at the hotels, various car parks and Pier 7, with other areas being operational. Pier 7 and the Car Park Y hotel have been identified as PAOCs due to the presence of balancing ponds and ponds and the unknown nature of infilled materials. Further investigation is proposed, and a remediation strategy would be prepared subject to the results of the investigation. In most cases, the impact of the remaining construction activities on the aquifers would be low. The sensitivity of the resource is medium (Secondary A aquifer) and low (Unproductive aquifer). The level of effect would be **minor adverse to negligible**, which would not be significant.

10.9.33 Potential impacts from spillages and leaks of fuel and chemicals from the construction compounds/areas under construction would remain. There would also be a risk of potential leaks of fuels and chemicals within the operational areas of the Project site. With the implementation of measures identified in Table 10.8.1, the magnitude of the potential impacts would be negligible. The sensitivity of the Secondary A aquifer is medium, and the Unproductive aquifer has a low sensitivity. The level of effect would be **minor adverse** (Secondary A aquifer) and **negligible** (Unproductive aquifer), which would not be significant.

10.9.34 Operational areas would be managed in accordance with standard operational procedures and the mitigation measures in Table 10.8.1. On this basis, the magnitude of impact would be no change and the level of effect would be **no change**, which would not be significant.

Impacts on Surface Watercourses

10.9.35 During this phase, impacts of the Project on surface water quality may still arise from runoff from construction areas and also as a result of contaminants in soils or perched groundwater migrating to surface waters. The junction improvement works would be accompanied by the installation of drainage early in the construction process ensuring that surface water runoff would be suitably managed during construction.

10.9.36 The assessment of effects from the construction of other development areas with would be the same as described for those identified within the initial construction phase (2024-2029).

10.9.37 Potential impacts on surface waters could also arise from leaks and spillages from construction compounds/areas under construction and from operational areas of the Project. With the implementation of the measures identified in Table 10.8.1, the magnitude of impact would be

negligible. The receptor is considered to be highly sensitive (as a worst case) and, on this basis, the level of effect would be **minor adverse**, which would not be significant.

10.9.38 Operational areas would be managed in accordance with standard operational procedures and the mitigation measures in Table 10.8.1. On this basis, the magnitude of impact would be no change and the level of effect would be **no change**, which would not be significant.

Impacts on Human Health

10.9.39 Construction is proposed to be ongoing during this period, with further development areas within PAOCs and therefore the assessment of effects from the construction of other development areas with would be the same as described for those identified within the initial construction phase (2024-2029). The overall magnitude of the impact across the site would be low and the level of effect would be **minor adverse**, which would not be significant.

10.9.40 Following the completion of remediation in the PAOCs and other development areas (as appropriate), the magnitude of impact would be negligible. The sensitivity of the airport users and site workers are considered to be medium and therefore, the level of effect would be **negligible**, which would not be significant.

Further Mitigation and Future Monitoring

10.9.41 No further mitigation or monitoring measures are proposed.

Significance of Effects

10.9.42 No further mitigation or monitoring is required. Therefore, the significance of effects would remain as presented above.

2033-2038

Impacts on Non-Agricultural Soil Resources

10.9.43 The assessment of effects with regard to non-agricultural soil resources would be as described for the first full year of opening: 2029.

Impacts on Aquifers

10.9.44 In 2032, the assessment of effects with regard to aquifers would be as described for the first full year of opening: 2029.

10.9.45 Between 2032 and 2038, the majority of construction activity would be complete with some ongoing final construction activities taking place. The assessment of effects from the construction would be the same as described for those identified within the previous construction phase.

Impacts on Surface Watercourses

10.9.46 In 2032, the assessment of effects with regard to surface watercourses would be as described for the first full year of opening: 2029.

10.9.47 The remaining construction activities from 2032 onwards are considered unlikely to have a direct impact on surface watercourses other than with regard to the potential, albeit very limited in areas of previously undeveloped land, for contaminated runoff. In these areas, the magnitude of impact

would be negligible, and the sensitivity of the receptor would be high. The level of effect would be **minor adverse**, which would not be significant.

Impacts on Human Health

10.9.48 Where remediation is required for the remaining construction areas from 2032 onwards, the magnitude of impact is predicted to be medium. However, the requirement for remediation is likely to be localised in its extent and complexity. In the majority of the remaining construction areas, remediation is unlikely to be required and the magnitude of impact would be low.

10.9.49 With mitigation implemented as described above for the construction phase, the overall magnitude of impact for construction phase effects would be low and the level of effect would be **minor adverse**, which would not be significant.

10.9.50 In 2032, the long term assessment of effects with regard to operation site users (human health) would be as described for the first full year of opening: 2029.

Design Year: 2038

Impacts on Non-Agricultural Soil Resources

10.9.51 Prior to 2038, the assessment of effects with regard to non-agricultural soil resources would be the same as described for the first full year of opening: 2029.

10.9.52 By 2038 the construction compounds would be demobilised and those compounds on previously undeveloped land would be returned to their former use. The magnitude of the impact would be low and the sensitivity of the resource is low, therefore the level of effect would be **minor beneficial**, which would not be significant.

Impacts on Aquifers

10.9.53 There would be no change in terms of impacts on aquifers in 2038 as only operational activities would be undertaken. Taking into account the proposed drainage strategy, pollution control measures and existing measures in place to control airport operations, no additional effect is likely. The level of effect would be **no change**, which would not be significant.

Impacts on Surface Watercourses

10.9.54 The surface access improvements proposed as part of the Project would result in additional surface water runoff due to the introduction of new impermeable area. As part of these works, it is proposed that a drainage network would be installed, consisting of carrier drains, filter drains, ditches and attenuation ponds, along with flow control arrangements to limit discharges to watercourses.

10.9.55 The installation of interceptors and appropriate pollution control measures as part of the design of the Project's surface water drainage and pollution control system would control the magnitude of impact on surface watercourses to sure that there would be no change compared to existing operations. The level of effect would be **no change**, which would not be significant.

Impacts on Human Health

10.9.56 Following the completion of remediation, the magnitude of impact would be negligible. The sensitivity of the airport users and site workers is considered to be medium and, therefore, the level of effect would be **negligible**, which would not be significant.

Further Mitigation and Future Monitoring

10.9.57 No further mitigation or monitoring measures are proposed.

Significance of Effects

10.9.58 No further mitigation or monitoring is required. Therefore, the significance of effects would remain as presented above.

10.10. Potential Changes to the Assessment as a Result of Climate Change

10.10.1 The likely ranges of change in climatic parameters, including precipitation, temperature, wind speed, humidity and frequency of extreme weather, are not considered to materially affect the future baseline conditions for geology and ground conditions or increase the sensitivity of receptors to impacts beyond that described in Section 10.9.

10.10.2 Gross contamination that may be represented as an ‘infinite source term’ for the generation of VOCs has not been identified. Any future potential for increased volatilisation in higher temperatures during operation is not therefore considered significant.

10.11. Cumulative Effects

Zone of Influence

10.11.1 The zone of influence (ZoI) for geology and ground conditions has been identified based on the spatial extent of likely effects. For this topic, the ZoI broadly equates to the study area for the assessment of effects on these resources as described in Section 10.4.

Screening of Other Developments and Plans

10.11.2 The Cumulative Effect Assessment (CEA) takes into account the impact associated with the Project together with other developments and plans. The other developments and plans selected as relevant to the CEA presented within this chapter are based upon the results of a screening exercise undertaken as part of the 'CEA short list' of developments (see Appendix 19.4.1). Each development on the CEA long list has been considered on a case by case basis for scoping in or out of this chapter's assessment based upon data confidence, effect-receptor pathways and the spatial/temporal scales involved.

10.11.3 In undertaking the CEA for the Project, it is important to bear in mind that the likelihood of other developments and plans being constructed varies depending on how far along the planning process they are. For example, relevant developments and plans that are already under construction are likely to contribute to a cumulative impact with the Project (providing impact or spatial pathways exist), whereas developments and plans not yet approved or not yet submitted are less certain to contribute to such an impact, as some may not achieve approval or may not ultimately be built due to other factors. For this reason, all relevant development and plans considered cumulatively alongside the Project have been allocated into 'Tiers', reflecting their

current stage within the planning and development process. Appropriate weight is therefore given to each Tier in the decision-making process when considering the potential cumulative impact associated with the Project (eg it may be considered that greater weight can be placed on the Tier 1 assessment relative to Tier 2). Further details of the screening process for the inclusion of other developments and plans in the short list and a description of the Tiers is provided in Chapter 19: Cumulative Effects and Inter-relationships.

10.11.4 The shortlisted developments scoped into the CEA for geology and ground conditions and the Tier in which each has been allocated, is outlined in Table 10.11.1.

Table 10.11.1: List of Other Developments and Plans Considered within the CEA

Description of Development/Plan	Planning Phase	Distance from the Project	Date of Construction (if applicable)	Overlap with the Project?
Tier 1				
Gatwick Station improvements	Underway	0 km	N/A	Not yet known
Tier 3				
Horley Employment Park – Strategic Employment Site	Allocation	0.4 km	N/A	Not yet known
Crawley Sewage Treatment Works extension	Unknown	0 km	N/A	Not yet known
Hookwood Site Allocation – dwellings and pitches	Allocation	0.3 km	N/A	Not yet known

Cumulative Effects Assessment

10.11.5 A description of the significance of cumulative effects upon any geology and ground conditions receptor arising from each identified impact is given below.

Initial Construction Phase: 2024-2029

Non-Agricultural Soil Resource

10.11.6 The Tier 3 development would involve the permanent sealing of the soil resource at the proposed Horley Business Park and Hookwood Site, however the soil is considered to be of low sensitivity as it does not support any statutory or non-statutory designated sites or notable/priority habitats. The cumulative effect of this development with the Project would not be significant.

10.11.7 An area of land has been identified for a potential expansion of the existing Crawley Sewage Treatment Works, if required. In the event that this development comes forward, it would be undertaken by Thames Water. The Tier 1 development at Gatwick Airport would involve no change to the current hard cover. Neither development would be expected to have any significant cumulative effect with this development.

Aquifers

10.11.8 Superficial deposits, which comprise the Secondary A aquifer, are primarily absent from the other development sites. The low sensitivity Weald Clay directly underlies most of the majority of the sites and is, therefore, unlikely to be connected to the Project site. On this basis, there would be no significant cumulative effects.

Surface Watercourses

10.11.9 The two large development sites at Horley and Hookwood have the potential to impact on surface water quality arising from runoff from construction areas.

10.11.10 There are no surface watercourses in the immediate vicinity of the proposed Horley Business Park that connect to watercourses on the Project site. Therefore, no cumulative effects would occur.

10.11.11 Surface waters around the Hookwood development would ultimately discharge to the River Mole at some distance from the project site. Given the measures proposed for the Northern Runway Project, there would be no material contribution to any cumulative effect. With effective measures to control surface water runoff in place for both developments no significant cumulative effects would occur.

Human Health

10.11.12 The planning process for the other developments would involve a risk assessment of the potential for contamination on their sites and the implementation of mitigation/remediation (where appropriate) to reduce risks to on and offsite receptors. On this basis, cumulative effects of the proposed Horley Business Park with the Project would not be significant.

Mineral Safeguarding

10.11.13 The proposed Horley Business Park is not designated as a mineral safeguarding area and therefore, no significant cumulative effects would occur.

2030-2038

10.11.14 No further cumulative effects, other than those set out above, have been identified.

10.12. Inter-Related Effects

10.12.1 This chapter assesses the significance of potential effects on geology and soils. Potential effects on the water environment, including surface water, are considered within Chapter 11: Water Environment, which provides a detailed assessment of the baseline water environment conditions.

10.12.2 The design of the Project elements is discussed within Chapter 5: Project Description. The design aims for all materials (soils and rocks) generated by the Project to be reused within the Project, wherever possible. The reuse of these materials would require demonstration that they are both environmentally and geotechnically suitable.

10.12.3 Loss of soil as a resource has been qualitatively assessed within this chapter. Further assessment is provided within Chapter 18: Agricultural Land Use and Recreation, including the assessment of impacts on agricultural land using the agricultural land classification.

10.12.4 The generation of construction dust is assessed within Chapter 13: Air Quality.

10.12.5 Further details of inter-related effects are provided in Chapter 19: Cumulative Effects and Inter-relationships.

10.13. Summary

10.13.1 The Project site is underlain by superficial deposits including Alluvium, Head and River Terrace Deposits. The deposits are associated with the surface watercourses that flow across the site and are classified as Secondary A aquifers and have a medium sensitivity. The underlying bedrock comprises Weald Clay, which is classified as an unproductive stratum and has a low sensitivity.

10.13.2 The Project site is located within a Brick Clay Resource Mineral Safeguarding Area as designated by the West Sussex County Council Minerals Planning Authority.

10.13.3 A review of historic maps shows that the Project site had been developed as an aerodrome by the 1930s and major airport development had occurred by the 1950s. Prior to this, the site was used as farmland, a racecourse and golf course, with a railway line through the site. The airport has been subject to further development, which has been accompanied by an extensive drainage and balancing pond network and hotel, car parking and commercial development.

10.13.4 A number of previous investigations have been undertaken on the Project site, the review of which has focused on the areas of the site proposed for redevelopment. Elevated levels of contaminants were detected in soil, leachate and groundwater samples taken from various locations, together with elevated levels of ground gas.

10.13.5 A site walkover was undertaken in September 2019 in order to ground truth information from the desk study and to identify potentially contaminating land uses. This information was combined together to identify PAOCs. A strategic approach is proposed to target parts of the Project site where further investigation may be required based on the potential for contamination to exist and the future use of the area.

10.13.6 The assessment has considered potential impacts on the underlying aquifers, surface watercourses, human health (construction workers and future site users) and mineral resources. The significance of effect ranges from temporary minor adverse effects with regard to human health during construction where remediation is required, to no change during the operational phase.

Next Steps

10.13.7 Further ground investigation and assessment will be undertaken in specific areas to verify risks arising from land contamination prior to construction. This will include limited soil, groundwater sampling and testing along with ground gas and groundwater monitoring which will inform any further mitigation to be incorporated within the Project.

Table 10.13.1: Summary of Effects

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
Initial Construction Phase 2024-2029							
Non-agricultural soil resource	Low	Use of previously undeveloped land for compounds.	Temporary (medium/long term)	Low (adverse)	Negligible (adverse)	Not Significant	
	Negligible	Other compounds (previously developed).		No change	No change	Not Significant	
	Negligible	Relocation of airfield facilities.	Permanent (long term)	Low (adverse)	Negligible (adverse)	Not Significant	
Aquifers	Medium (Secondary A aquifer) Low (Unproductive strata)	Migration of contaminants in soils and perched groundwater through creation of new pathways including piling.	Short term	Negligible (adverse)	Minor (adverse) Negligible (adverse)	Not significant	
Surface watercourses	High	Migration of contaminants in soils and perched groundwater and surface water runoff into surface waters.	Short term	Negligible (adverse)	Minor (adverse)	Not significant	

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
Human health – construction workers	High	Exposure through dermal contact, ingestion and inhalation of contaminated soil derived dusts/ground gases.	Short term	Low (adverse)	Minor (adverse)	Not Significant	
Brick Clay Resource Mineral Safeguarding Area	Medium	Loss of mineral resource.	Permanent (long term)	Low (adverse)	Minor (adverse)	Not Significant	
2030-2032							
Non-agricultural soil resource	Low	Use of previously developed land for junction improvement works.	Permanent (long term)	Low (adverse)	Negligible (adverse)	Not Significant	
Aquifers	Medium (Secondary A aquifer) Low (Unproductive strata)	Spills and leaks of chemicals from construction compounds.	Short term	Negligible (adverse)	Minor (adverse) Negligible (adverse)	Not Significant	
		Operational areas – spillages and leaks of chemicals.	Permanent (long term)	No change	No change	Not Significant	

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
Surface watercourses	High	Construction – spillages and leaks of chemicals.	Short term	Negligible (adverse)	Minor (adverse)	Not Significant	
		Operational areas – spillages and leaks of chemicals.	Permanent (long term)	No change	No change	Not Significant	
Human health – construction worker	High	Exposure through dermal contact, ingestion and inhalation of contaminated soil derived dusts/ground gases.	Short term	Low (adverse)	Minor (adverse)	Not Significant	
Human health – future site user	Medium	Exposure through dermal contact, ingestion and inhalation of contaminated soil derived dusts/ground gases.	Permanent (long term)	Negligible (adverse)	Negligible (adverse)	Not Significant	
2033-2038							
Non-agricultural soil resource	Effects as assessed for 2029.						

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
Aquifers	Medium (Secondary A aquifer) Low (Unproductive strata)	Remaining construction areas – migration of contaminants in soils and perched groundwater through creation of new pathways including piling.	Short term	Low (adverse)	Minor (adverse) Negligible (adverse)	Not Significant	
Surface watercourses	High	Construction – spillages and leaks of chemicals.	Short term	Negligible (adverse)	Minor (adverse)	Not Significant	
Human health – construction worker	High	Remediation works.	Short term	Low (adverse)	Minor (adverse)	Not significant	
Human health – future site user	Medium	Exposure through dermal contact, ingestion and inhalation of contaminated soil derived dusts/ground gases.	Permanent (long term)	Negligible (adverse)	Negligible (adverse)	Not Significant	

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
Design Year: 2038							
Non-agricultural soil resource	Low	Demobilisation of compounds.	Permanent (long term)	Low (beneficial)	Minor (beneficial)	Not Significant	
Aquifers	Medium (Secondary A aquifer) Low (Unproductive strata)	Operational areas – spillages and leaks of chemicals.	Permanent (long term)	No change	No change	Not Significant	
Surface watercourses	High	Operational areas – spillages and leaks of chemicals.	Permanent (long term)	No change	No change	Not Significant	
Human health – future site user	Medium	Exposure through dermal contact, ingestion and inhalation of contaminated soil derived dusts/ground gases.	Permanent (long term)	Negligible (adverse)	Negligible (adverse)	Not Significant	

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10.15. Glossary

Term	Description
bgl	Below ground level
BGS	British Geological Survey
CARE	Central Area Recycling Enclosure
CEA	Cumulative Effects Assessment
CHP	Combined Heat and Power
CIRIA	Construction Industry Research and Information Association
CS	Characteristic Situation
CoCP	Code of Construction Practice
CSM	Conceptual site model
DMRB	Design Manual for Roads and Bridges
EIA	Environmental Impact Assessment
EPA	Environmental Protection Act
ES	Environmental Statement
GWDTE	Groundwater dependent terrestrial ecosystems
LGS	Local Geological Sites
l/hr	Litres per hour
MMP	Materials Management Plan
NPPF	National Planning Policy Framework
NPPG	National Planning Practice Guidance
NPS	National Policy Statement
NVZ	Nitrate Vulnerable Zone
PAOC	Potential Areas of Concern
PEIR	Preliminary Environmental Information Report
PIAT	Projector, Infantry, Anti-Tank
Ppm	Parts per million
Q95	5 percentile flow
RAF	Royal Air Force
RBMP	River Basin Management Plan
SAC	Special Area of Conservation
SgZ	Safeguard Zone
SPA	Special Protection Area
SPZ1	Groundwater Source Protection Zone - Inner Zone
SPZ2	Groundwater Source Protection Zone - Outer Zone
SPZ3	Groundwater Source Protection Zone - Total Catchment
SSSI	Site of Special Scientific Interest
UXO	Unexploded Ordnance
VOC	Volatile Organic Compound
WFD	Water Framework Directive
ZoI	Zone of Influence

Preliminary Environmental Information Report
Chapter 11: Water Environment

September 2021

Table of Contents

11 Water Environment

11.1 Introduction

11.1.1 This chapter of the Preliminary Environmental Information Report (PEIR) presents the findings of the Environmental Impact Assessment (EIA) work undertaken to date concerning the potential effects of the proposal to make best use of Gatwick's existing runways (referred to within this report as 'the Project') on the water environment. For the purposes of this assessment, the water environment constitutes:

- flood risk;
- surface water drainage;
- geomorphology;
- water environment regulations;
- water quality;
- groundwater resources;
- wastewater infrastructure; and
- water supply infrastructure.

11.1.2 This chapter considers the existing (current baseline) conditions, and the impact of the Project on the water cycle including: flood risk, surface water drainage, geomorphology, water quality, groundwater resources, water supply and wastewater. The water environment also interfaces with other environmental disciplines, whose chapters should be read in conjunction with this, eg Chapter 9: Ecology and Nature Conservation (which includes aquatic habitats and ecology) and Chapter 10 Geology and Ground Conditions (which includes groundwater quality).

11.1.3 In particular, this PEIR chapter:

- sets out the existing and future environmental baseline conditions, established from desk studies, surveys and consultation to date;
- presents the potential environmental effects on the water environment arising from the Project, based on the information gathered and the analysis and assessments undertaken to date;
- identifies any assumptions and limitations encountered in compiling the environmental information; and
- highlights any necessary monitoring and/or mitigation measures that could prevent, minimise, reduce or offset the possible environmental effects identified in the EIA process.

11.1.4 This chapter is accompanied by a summary of relevant local policy (Appendix 11.2.1), a summary of stakeholder scoping responses (Appendix 11.3.1), a Flood Risk Assessment (Appendix 11.9.1), Water Environment Regulations Assessment (Appendix 11.9.2), Geomorphology Assessment (Appendix 11.9.3), Water Supply Assessment (Appendix 11.9.4) and the following figures:

- Figure 11.4.1: Water Environment Study Area;
- Figure 11.6.1: General Water Features;
- Figure 11.6.2: Environment Agency Published Flood Zones;
- Figure 11.6.3: Upper Mole Model 1% (1 in 100) AEP Event Extent;
- Figure 11.6.4: Environment Agency Risk of Flooding from Surface Water Extents;

- Figure 11.6.5: Areas Susceptible to Groundwater Flooding;
- Figure 11.6.6: Flood Risk from Reservoirs;
- Figure 11.6.7: Contaminated Water Path – Existing Route;
- Figure 11.6.8: Groundwater Levels and Aquifer Designation;
- Figure 11.6.9: Wastewater Infrastructure 2019;
- Figure 11.8.1: Contaminated Water Path – Project Option Route;
- Figure 11.8.2: Project Wastewater Infrastructure;
- Figure 11.9.1: Upper Mole Model 1% (1 in 100) AEP event + 35% Climate Change Depth Difference to Baseline (with-Project, with-Mitigation); and
- Figure 11.9.2: Upper Mole Model 1% (1 in 100) AEP event + 70% Climate Change Depth Difference to Baseline (with-Project, with-Mitigation).

11.1.5 The PEIR will inform pre-application consultation. Following consultation, comments on the PEIR will be reviewed and taken into account, where appropriate, in preparation of the Environmental Statement (ES) that will accompany the application to the Planning Inspectorate for development consent.

11.2 Legislation and Policy

Legislation

11.2.1 A summary of key legislation of relevance to the water environment is included in Table 11.2.1.

Table 11.2.1: Summary of Legislation Relevant to the Water Environment

Legislation	Description and Relevance
The Water Environment (Water Framework Directive) (England and Wales) Regulations (2017)	The Water Environment Regulations (WER) 2017 have been transposed from the Water Framework Directive (2000/60/EC) and adopted more widely post January 2021 transitional arrangements. The provisions of WER require that environmental objectives are set for all surface and groundwater bodies to have regard for water quality standards and betterment wherever possible. The Water Environment Regulation assessment needs to be taken into account in the planning of all new activities in the water environment. The Environment Agency, as competent authority in England and Wales is responsible for delivering the objectives through the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017.
Urban Wastewater Treatment Directive (91/271/EEC)	The objective of the Urban Wastewater Treatment Directive (UWWTD) is to protect the environment from the adverse effects of urban waste water discharges and discharges from certain industrial sectors, and concerns the collection, treatment and discharge of domestic waste water; mixture of waste water and waste water from certain industrial sectors. It aims to protect the environment from the adverse effects of the collection, treatment and discharge of urban wastewater.
Groundwater Directive (2006/118/EC)	The Water Environment Regulations, require specific measures to be proposed to prevent and control groundwater pollution and achieve good

Legislation	Description and Relevance
	groundwater chemical status. These measures include criteria for assessing the chemical status of groundwater and for identifying trends in pollution of groundwater bodies. Hazardous substances must be prevented from entering groundwater.
Floods Directive (2007/60/EC)	The objective of the Floods Directive is to establish a framework for the assessment and management of flood risk to reduce the negative consequences of flooding on human health, economic activities, the environment and cultural heritage. The Directive which applies to all kinds of floods (river, lakes, flash floods, urban floods, coastal floods, including storm surges and tsunamis), on all of the European Union (EU) territory requires Member States to approach flood risk management in a three stage process, including preliminary flood risk assessment; develop flood risk maps and produce flood risk management plans. The Environment Agency has delivered the requirements of the Floods Directive through its flood hazard and risk maps, and Flood Risk Management Plans.
Drinking Water Directive (2015/1787/EU)	This directive requires that drinking water be free of any microorganisms, parasites or substances that could potentially endanger human health. It sets standards for the most common, potentially harmful organisms and substances that can be found in drinking water.
Reservoirs Act 1975	This legislation was enacted to protect against escapes of water from large reservoirs or from artificially created or enlarged lakes. The Reservoirs Act has been amended by the Flood and Water Management Act 2010. It essentially provides regulation for assessing risk of escape of water and ensuring that reservoirs are regularly monitored and their asset status (integrity) is regularly assessed.
Environmental Protection Act 1990	This defines the fundamental structure for waste management and control of emissions, including contaminated land.
Land Drainage Act 1991 (as amended)	This requires that a watercourse be maintained by its owner in such a condition that the free flow of water is not impeded. The riparian owner must accept the natural flow from upstream but need not carry out work to cater for increased flows resulting from some types of works carried out upstream.
Water Resources Act 1991 (as amended)	This legislation regulates water resources, water quality, water pollution, flood defence, and provides for the general management of water resources, the standards expected for controlled waters, and mitigation through flood defence.
Environment Act 1995	This legislation set the standard for environmental management and made provision for the establishment of the Environment Agency. The Environment Agency are a key consultee for water environment elements of the Project.

Legislation	Description and Relevance
Control of Pollution (Oil Storage) (England) Regulations 2001 (SI 2954)	Statutory Instrument 2954 provides legislation to prevent pollution of the water environment, by minimising and/or preventing future contamination of controlled water by oil. It supports the Groundwater Directive and the EU Directive on Dangerous Substances (76/464 EEC).
Climate Change Act 2008	This legislation requires that emissions of carbon dioxide and other greenhouse gases are reduced and that climate change risks are prepared for. The Project is expected to consider the impact of climate change when assessing future effects.
Flood Risk Regulations 2009	This legislation was enacted to support the delivery of the Floods Directive requirements and outlines the requirements for flood protection and flood risk management, subsequently reflected in the Flood and Water Management Act, 2010.
Flood and Water Management Act 2010	This Act established Lead Local Flood Authorities (LLFA) with responsibilities to manage local sources of flooding. East Sussex and Surrey County Councils are statutory consultees for the Project as LLFAs.
Water Act 2014	This legislation governs public water supply, water companies and provides greater protection to consumers. It sets out the main powers for water companies and provides a framework for licensing and permitting.
The Private Water Supplies (England) Regulations 2016, as amended	This legislation sets out standards for private water supplies including wells and boreholes. It establishes a framework for monitoring and ensuring water quality standards.
The Water Supply (Water Quality) Regulations 2016	These regulations consolidated legislation concerning the quality of water supplies for human consumption in England. They aim to prevent contamination of water supply and ensure standards for water quality are met.
The Environmental Permitting (England and Wales) Regulations 2016 (as amended)	The regulations set out the guidelines for environmental permitting, the circumstances in which environmental permits are required, and compliance obligations. It is relevant to, for example, any works in rivers, dewatering, and any discharges to water bodies.

Planning Policy Context

National Policy Statements

11.2.2 The Airports National Policy Statement (NPS) (Department for Transport, 2018a), although primarily provided in relation to a new runway at Heathrow Airport, remains a relevant consideration for other applications for airport infrastructure in London and the south east of England.

11.2.3 The NPS for National Networks (Department for Transport, 2015)[1] sets out the need for development of road, rail and strategic rail freight interchange projects on the national networks

[1] It is noted that the Transport Decarbonisation Plan published by Department for Transport (DfT) on 14 July 2021 announced DfT's intention to review the NPS for National Networks in due course once demand patterns post-pandemic become clearer. It is understood DfT intends to commence the review by the end of 2021 and complete it by Spring 2023. In the interim and whilst the review is

and the policy against which decisions on major road and rail projects will be made. This NPS would cover the highways improvements elements of the Project. This has been taken into account in relation to the highways improvements proposed as part of the Project.

11.2.4 The Draft National Policy Statement for Water Resources Infrastructure (Department for Environment and Rural Affairs, 2018) has been consulted on and responses are currently being considered by the UK government. Any implications for the Project will be considered when the NPS is issued.

11.2.5 Table 11.2.2 provides a summary of the relevant requirements of these NPSs and how these are addressed within the PEIR.

Table 11.2.2: Summary of NPS Information Relevant to this Chapter

Summary of NPS requirement	How and where considered in the PEIR
Airports NPS	
4.7: Where the applicant's proposals in relation to surface access meet the thresholds to qualify as nationally significant infrastructure projects under the Planning Act 2008, or is associated development under section 115 of the Planning Act 2008, the Secretary of State will consider those aspects by reference to both the National Networks NPS and the Airports NPS, as appropriate.	The consideration of the impacts and effects of the Project on the water environment as a result of highways improvement proposals would need to address the requirements of the National Policy Statement for National Networks. The impacts of surface access are addressed in Appendix 11.9.1 for flood risk, and in Appendix 11.9.2 for water quality.
4.46 and 4.49: Detailed consideration must be given to the range of potential impacts of climate change using the latest UK Climate Projections available at the time, and to ensuring any environmental statement that is prepared identifies appropriate mitigation or adaptation measures.	Reference is made to the influence of climate change on the assessment in Sections 11.6 and 11.10.
4.47: Where transport infrastructure has safety-critical elements, and the design life of the asset is 60 years or greater, the applicant should apply the latest available UK Climate Projections, considering at least a scenario that reflects a high level of greenhouse gas emissions at the 10%, 50% and 90% probability levels.	While the existing and northern runways would be considered as safety-critical infrastructure, the design life of the Project as a whole has been assumed to be 40 years having had consideration for the past history of development of airport and roads infrastructure at Gatwick. The proposed road junction improvements have been assessed separately (but in the context of the wider airport development having occurred) assuming a 100 year lifetime. A sensitivity test would be included in the ES of a greater predicted change to rainfall and river flows due

undertaken, DfT has confirmed the NPS for National Networks remains relevant government policy and has full force and effect for the purposes of the Planning Act 2008.

Summary of NPS requirement	How and where considered in the PEIR
	to climate change in accordance with Environment Agency guidance.
5.153: The applicant should consider the risk of all forms of flooding to the Project or arising from the Project and demonstrate how these risks will be managed and, where relevant, mitigated, so that the Project remains safe through its lifetime.	A flood risk assessment (FRA) (included here as Appendix 11.9.1) has been produced for the Project, which considers all forms of flood risk from and due to the Project and describes the proposed flood mitigation strategy that forms part of the Project. This PEIR chapter summarises the key findings of the FRA.
5.154: Take into account the impacts of climate change, clearly stating the Project lifetime over which the assessment is made.	Climate change impacts have been considered in Appendix 11.9.1 and in Section 11.10 of this chapter.
5.154: Assessing any residual risks after risk reduction measures have been taken into account and demonstrating how these are acceptable for the Project.	Potential residual risks are discussed in Section 11.9 where it is demonstrated how these would be managed appropriately, ensuring that flood risk to the Project, or third parties within the study area, would not be increased.
5.154: Consider if there is a need to remain operational during a worst-case flood event during the Project's lifetime and the need for safe access and exit arrangements.	For this assessment, the design event for the Project is the 1 per cent (1 in 100) Annual Exceedance Probability (AEP2) event, including a 35 per cent allowance for climate change. It has been demonstrated within the FRA (Appendix 11.9.1) that the runways would not be flooded and would remain operational for such an event, if required. In terms of the terminal buildings and their surrounding areas, existing flood risk would potentially have an operational impact, however, flood risk is not adversely impacted from the Project. Dry access and egress routes above peak flood water levels are available via high-link bridges and multi-storey car parks from the terminal buildings.
5.154: Provide evidence for the Secretary of State to apply the Sequential Test and Exception Test, via a suitable flood risk assessment.	Evidence for the application of the Sequential and Exception Tests is included in the FRA (Appendix 11.9.1).
5.183: The Secretary of State will generally need to give more weight to impacts on the water environment where a project would have adverse effects on the achievement of the environmental objectives established under the Water Framework Directive compliance assessment.	The impacts are identified in the Water Environment Regulations compliance assessment in Appendix 11.9.2.

[2] Annual Exceedance Probability (AEP) refers to the chance that a flood event of a particular magnitude is experienced or exceeded during any one year.

Summary of NPS requirement	How and where considered in the PEIR
NPS for National Networks	
Sections 5.90 – 5.115 sets out the requirements in relation to flood risk. Where flood risk is a factor the application must be supported by a Flood Risk Assessment and that the Sequential and Exception Tests have been applied in accordance with the National Planning Policy Framework (NPPF).	A FRA has been included as Appendix 11.9.1 that informs the assessment of the impact of the Project. The FRA also demonstrates the Project's compliance with the Sequential and Exception Tests.
Sections 5.216 to 5.231 set out the requirements in relation to water quality and resources. An applicant should ascertain the existing status of, and carry out an assessment of the impacts on, water quality water resources and physical characteristics (geomorphology) as part of the environmental statement.	The existing status of water resources in the study area is summarised in Section 11.6 (baseline environment) and the impacts are assessed and summarised in Section 11.9.

National Planning Policy Framework

11.2.6 The National Planning Policy Framework (NPPF) (Ministry of Housing, Community and Local Government, 2021) sets out the planning policies for England. It describes how these should be applied and aims to contribute towards sustainable development.

11.2.7 The NPPF does not include specific policies for nationally significant infrastructure but states that:

'these are determined in accordance with the decision-making framework in the Planning Act 2008 (as amended) and relevant national policy statements for major infrastructure, as well as any other matters that are relevant (which may include the National Planning Policy Framework)'

11.2.8 Section 14 of the NPPF: 'Meeting the challenge of climate change, flooding and coastal change' is relevant to the water environment and considers the impact of climate change to flood risk, coastal change and water supply.

11.2.9 Paragraphs 159 to 169 set out flood risk policies to be followed by all proposed developments. These policies set strict tests to protect people and property from flooding. Where these tests are not met, national policy is clear that new development should not be allowed. The main steps are designed to ensure that if there are better sites in terms of flood risk, or a proposed development cannot be made safe for its lifetime, ensuring flood risk is not increased elsewhere, it should not be permitted.

11.2.10 Section 15 of the NPPF: 'Conserving and enhancing the natural environment' is relevant to water quality and sets out the requirement of:

'e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution…'

11.2.11 It also states that development should, wherever possible, help to improve local environmental conditions including water quality.

11.2.12 The National Planning Practice Guidance (NPPG) (Ministry of Housing, Communities and Local Government, 2019) supports the NPPF and provides guidance across a range of topic areas. These include climate change, EIA, flood risk and coastal change, the natural environment, water supply, wastewater and water quality.

11.2.13 Guidance on climate change focuses on suitable mitigation and adaptation measures in the planning process. This includes considering availability of water and water infrastructure for the lifetime of a development and designing responses to promote water efficiency and protect water quality. Also, assessing the impact of and promoting design responses to flood risk for the lifetime of a development, accounting for how climate change would increase that risk.

11.2.14 Guidance on flood risk and coastal change sets out the steps to be followed in order to ensure development is steered to areas at low risk of flooding, providing evidence that it would remain safe for its lifetime and would not increase flood risk elsewhere.

11.2.15 Guidance on water supply, wastewater and water quality includes advice on how planning can ensure water quality and the delivery of adequate water and wastewater infrastructure.

Other Relevant National Planning Policy

11.2.16 Other national aviation planning policy documents considered include:

- Aviation Policy Framework (Department for Transport, 2013);
- The Future of UK Aviation - Making Best Use of Existing Runways (HM Government, 2018); and
- Aviation 2050 - The Future of UK Aviation (Department for Transport, 2018b).

11.2.17 The Aviation Policy Framework sets out that it is essential to better understand and manage the risks associated with climate change for the long-term resilience of the aviation sector, although this pre-dated the Airports NPS.

11.2.18 The Future of UK Aviation Strategy sets out the UK government's framework for sustainable airport growth, making the case for more efficient use of the infrastructure available. The Aviation Strategy requires that the applicant will need to demonstrate how the Project would mitigate against local environmental issues. In December 2018, the Government published a Green Paper: Aviation 2050 - The Future of UK Aviation. The consultation ran from 17 December 2018 to 20 June 2019.

Local Planning Policy

11.2.19 Gatwick Airport lies within the administrative area of Crawley Borough Council and adjacent to the boundaries of Mole Valley District Council to the north west, Reigate and Banstead Borough Council to the north east and Horsham District Council to the south west. The administrative area of Tandridge District Council is located approximately 1.9 km to the east of Gatwick Airport, while Mid Sussex District Council lies approximately 2 km to the south east. Gatwick Airport is located in West Sussex, immediately adjacent to the bordering county of Surrey.

11.2.20 The relevant local planning policies applicable to the water environment based on the extent of the study area for this assessment are set out in Table 11.2.3. Further details are provided at Appendix 11.2.1.

Table 11.2.3: Local Planning Policy

Administrative Area	Plan	Policy
Adopted Policy		
Crawley	Crawley 2030: Crawley Borough Local Plan 2015-2030	ENV8: Development & Flood Risk ENV9: Tackling Water Stress ENV10: Pollution Management & Land Contamination
Horsham	Horsham District Planning Framework 2015	Policy 38: Flooding
Reigate and Banstead	Reigate and Banstead Local Plan: Core Strategy 2014	CS10: Sustainable Development
	Reigate and Banstead Local Plan Development Management Plan 2018-2027	CCF2: Flood Risk
Mole Valley	Mole Valley Core Strategy 2009	CS20: Flood Risk Management
	Mole Valley Local Plan 2000	ENV65: Drainage and Run Off ENV67: Groundwater Quality
Tandridge	Tandridge District Core Strategy 2008	CSP15: Environmental Quality
	Tandridge Local Plan Part 2: Detailed Policies 2014-2029	DP21: Sustainable Water Management
Emerging Policy		
Crawley	Draft Crawley Borough Local Plan 2021-2037	EP1: Development and Flood Risk EP3: Land and Water Quality GI1: Green infrastructure SDC1: Sustainable Design and Construction SDC3: Tackling Water Stress GAT1: Development of the Airport with a Single Runway
Mole Valley	Future Mole Valley 2018-2033 Consultation Draft Local Plan	EN10: Regionally Important Geological and Geomorphological Sites EN13: Promoting Environmental Quality EN14: Responding to the Climate Emergency INF2: Managing Flood Risk

Administrative Area	Plan	Policy
Horsham	Draft Horsham District Local Plan 2019-36	Policy 25: Environmental Protection Policy 27: The Natural Environment and Landscape Character Policy 37: Climate Change Policy 39: Sustainable Design and Construction Policy 40: Flooding
Tandridge	Our Local Plan 2033 (Regulation 22 Submission) 2019	TLP47: Sustainable Urban Drainage and Reducing Flood Risk

11.3 Consultation and Engagement

11.3.1 In September 2019, Gatwick Airport Limited (GAL) submitted a Scoping Report to the Planning Inspectorate, which described the scope and methodology for the technical studies being undertaken to provide an assessment of any likely significant effects and, where necessary, to determine suitable mitigation measures for the construction and operational phases of the Project. It also described those topics or sub-topics which are proposed to be scoped out of the EIA process and provided justification as to why the Project would not have the potential to give rise to significant environmental effects in these areas.

11.3.2 Following consultation with the statutory bodies, the Planning Inspectorate (on behalf of the Secretary of State) provided a Scoping Opinion on 11 October 2019.

11.3.3 Key issues raised during the scoping process specific to the water environment are listed in Table 11.3.1, together with details of how these issues have been addressed within the PEIR. Further details of individual consultee scoping responses are provided in Appendix 11.3.1.

Table 11.3.1: Summary of Scoping Responses

Details	How/where addressed in PEIR
The ES should assess impacts to the Baldhorns Brook, Ifield Brook and Stanford Brook and Mole (Hersham to River Thames confluence at East Molesey) where significant effects are likely to occur (ID 4.5.1)	The PEIR has scoped out these watercourses as no significant effects are likely to occur. Justification is provided in Table 11.4.2.
The ES should include an assessment of the potential impacts from increased flows on watercourses due to an increase in hardstanding/impermeable areas and consider water quality (ID 4.5.2)	The potential impacts from increased flows due to an increase in hardstanding/impermeable areas are considered in the Flood Risk Assessment in Appendix 11.9.1 and summarised in this chapter. An assessment of the impact on water quality is provided in Section 11.9.
The ES should quantify the baseline of such inputs/outputs of the balancing ponds in order to account for any changes and subsequent impacts and effects (ID 4.5.3)	Baseline surface water flows and discharge volumes from the balancing ponds are reported in the Flood Risk Assessment in Appendix 11.9.1. These are compared to

Details	How/where addressed in PEIR
	the equivalent with-Project values to identify any impacts and effects.
Ecology and geology and ground conditions should be cross-referenced where applicable (ID 4.5.4)	Cross references are provided where necessary. In addition, inter-relationships between topics are considered in Section 11.11 and in Chapter 19: Cumulative Effects and Inter-relationships.
The ES should include sufficient detail regarding mitigation measures during construction and operation and explain how this will be secured (ID 4.5.5)	Mitigation measures are set out in Section 11.8.
The ES should address the apparent contradiction regarding the capacity of the wastewater network in paragraphs 7.5.46 and 7.5.14 of the Scoping report. The ES should assess impacts to the existing drainage regime and its associated infrastructure (ID 4.5.6)	Paragraph 7.5.46 of the Scoping Report is referring to the current condition of the wastewater network where there are three pumping stations which have long running times during peak periods indicating stress on the system, namely PS03, PS07 and PS08. PS08 is currently being refurbished and fitted with higher capacity pumps which will accommodate future growth. PS03 and PS07 are both proposed to be replaced by new installations as part of the Project, and these would be sized to accommodate the projected growth. Paragraph 7.5.14 of the scoping report is true for the future situation (with Project). This PEIR considers the impact on the existing drainage regime and infrastructure where this is to be retained as part of the Project. Where new or replacement infrastructure is included in the Project, the assessment has been performed on this rather than the existing infrastructure.
The ES must describe how pluvial and fluvial flows will be managed during the construction phase and assess any significant effects of the proposed development (ID 4.5.7)	Fluvial and surface water/pluvial flood risk during the construction phase is considered within the Flood Risk Assessment at Appendix 11.9.1 and in Section 11.9.
Mitigation beyond what is proposed in the Scoping Report should be considered, specifically, to reduce consumption and to increase water recycling (ID 4.5.8)	Appropriate mitigation measures in terms of re-use, behaviours and new technologies have been examined, and applied to demand forecasts where appropriate to update future demand requirements. All considered efficiencies are detailed in Appendices 11.9.4.
The assessment of flood risk in the ES should take into account the potential impacts of climate change using the latest UK Climate Projections (UKCP) available at the time of preparation (ID 4.5.9)	The potential impacts of climate change have been taken into account within the Flood Risk Assessment provided in Appendix 11.9.1. The assessment follows the guidance published by the Environment Agency based on UKCP09. In July 2021 the published guidance for considering the future changes to peak river flow was updated to reflect UKCP18 data. The current assessment will be updated to

Details	How/where addressed in PEIR
	reflect the latest guidance to inform the Environmental Statement. However a review of the updated guidance indicates allowances for peak river flow have reduced and therefore the current fluvial flood risk mitigation strategy is considered to be conservative and would be able to incorporate the new allowances and meet the necessary regulatory requirements.
The assessment in the ES should, as appropriate, have regard to information being prepared by, Crawley Borough Council, Reigate and Banstead Borough Council and Mid Sussex District Council for their water cycle study (ID 4.5.10)	In the 'Gatwick Sub-region' Water Cycle Study (2020), Sutton and East Surrey Water (SESW) stated that there was sufficient capacity at their treatment works to meet projected demand. Additionally, at a meeting with GAL on 3/10/19, SESW stated that capacity issues at the treatment works would be unlikely as a result of the proposed works at the airport. Proposed future works at the treatment works will allow for additional demand, and Gatwick airport has two additional sources of supply which would allow alternate sources to be implemented, should the current source be deemed at risk.
The Applicant is advised to review the Inspectorate's Advice Note 18 when determining the scope and methodology of the Water Framework Directive assessment and consultation with the Environment Agency and LLFA (ID 4.5.11)	The Water Environment Regulations assessment (the relevant assessment to be undertaken following the UK's exit from the EU) is included as Appendix 11.9.2 and follows Advice Note 18.

11.3.4 Key issues raised during consultation and engagement with interested parties specific to the water environment are listed in Table 11.3.2, together with details of how these issues have been addressed within the PEIR.

Table 11.3.2: Summary of Consultation to Date

Consultee/issue	Date	Details	How/where addressed in PEIR
Environment Agency			
Flood risk, geomorphology, water quality and groundwater	15 August 2019	Introductory presentation to the Project and site visit. It is understood that the Environment Agency intends to update published flood zones with those developed from the new Upper Mole Hydraulic model (refer to	Sections 11.4 and 11.9.

Consultee/issue	Date	Details	How/where addressed in PEIR
		paragraph 11.6.55 and Figure 11.6.3).	
De-icer contamination and water quality	24 September 2019	Discussion and agreement of methodology and approach.	The methodology agreed for the impact assessment is outlined in Section 11.4 (paragraphs 11.4.28 to 11.4.30).
Flood Risk	25 November 2019	Presentation of emerging fluvial impacts and mitigation.	FRA in Appendix 11.9.1.
Flood risk, geomorphology, water quality and groundwater	28 January 2021	Reintroduction to the Northern Runway Project.	N/A
Flood risk	17 February 2021	Review of hydraulic modelling updates.	FRA in Appendix 11.9.1.
Water	29 April 2021	Review of draft PEIR and scoping review comments.	Throughout
West Sussex County Council as the Lead Local Flood Authority			
Flood Risk	September and October 2019	All primary flood risk related documentation is publicly available and has been sourced and reviewed. It is considered by GAL that this information sufficient to inform the PEIR.	Sections 11.4 and 11.9. FRA in Appendix 11.9.1.
Crawley Borough Council			
Groundwater	23 September 2019	Request for information to Crawley Borough Council on groundwater flooding and unlicensed abstractions.	Information has been requested and currently awaited.
Thames Water			
Wastewater	3 October 2019	Introductory presentation to the Project, hydraulic model construction and impact assessment methodology.	The PEIR includes an assessment of the impacts using the methodology outlined in the meeting. Thames Water will be undertaking their own assessment of impact upon their network.

Consultee/issue	Date	Details	How/where addressed in PEIR
Sutton and East Surrey Water (Water Supply)			
Water supply	24 October 2019	Introductory presentation to the Project, and water supply methodology for demand forecasting.	Sections 11.4 and 11.9, and SESW will be undertaking their own impact assessment.
Water supply	13 January 2020	SESW stated that their network and sources would be able to meet the increase in demand of the Project.	Throughout Section 11.9.

11.4 Assessment Methodology

Relevant Guidance

11.4.1 The assessment of the effects of the Project on the water environment has been undertaken in accordance with the legislation summarised in Section 11.1 and the guidance in the Design Manual for Roads and Bridges (DMRB) LA113 – Road Drainage and the Water Environment (Highways England *et al*, 2020). Where appropriate, informed professional judgement has been used, primarily in relation to geomorphology, where there is a lack of published guidance to date. Flood risk has been assessed in accordance with the requirements of the NPPF (Ministry for Housing, Communities and Local Government, 2021) and the accompanying online flood risk guidance. For the purposes of this assessment, the Project has been classed as 'Essential Infrastructure'. The NPPG (Ministry for Housing, Communities and Local Government, 2019) includes 'Essential transport infrastructure which has to cross the area at risk' within this category.

Scope of the Assessment

11.4.2 The scope of this chapter has been developed in consultation with relevant statutory and non-statutory consultees as detailed in Table 11.3.1 and Table 11.3.2.

11.4.3 Taking into account the scoping and consultation process, Table 11.4.1 summarises the issues considered as part of this assessment.

Table 11.4.1: Issues Considered within the Assessment

Issue	Potential Effects
Construction Phase (including Demolition): Water Environment	
Geomorphology	Sediment from construction areas washed off into watercourses increasing turbidity and impacting on morphology.
	Damage and loss of riparian vegetation.
	Damage and loss of natural bed and banks.
	Changes in flow (discharge and velocity) in channel and on floodplain.
	Changes in river continuity.
	Change in drainage strategy altering flows to receiving watercourses affecting flood risk, geomorphology and water quality.
	Modifications to groundwater recharge or flow paths could affect surface water flows due to connection via river terrace deposits.
Groundwater Resources	Construction dewatering affecting groundwater levels flows, creating potential settlement and mobilisation of contaminants.
	Piling introducing contaminants and creating contaminant pathways.
	Modifications to groundwater recharge or flow paths could affect surface water flows due to connection via river terrace deposits.
	Spillage at surface impacting the quality of groundwater resources.
Water Quality	Contaminated runoff or spillage from construction areas impacting surface water.
	Dewatering for foundations/sub-surface structures resulting in changes to surface water quality.
	Change in drainage strategy altering flows to receiving watercourses affecting flood risk, geomorphology and water quality.
	Dewatering for foundations, basement and other sub-surface structures resulting in changes to groundwater flow and quality of groundwater resources (including any private water supplies, if present).
Flood Risk	Temporary storage of materials reduces the volume of floodplain storage increasing flood risk.
	Increased flood risk due to existing surface water flow paths being interrupted, diverted or created by construction works, or due to increased compaction of ground or increase in impermeable area.
	Failure of temporary over-pumping arrangements of the surface water drainage and foul networks resulting in flooding.
	Dewatering for foundations, basement and other sub-surface structures resulting in changes to groundwater levels and flow routes and altering flood risk, exacerbated due to potential hydraulic connectivity between groundwater and surface water resources.
	Temporary works for outfalls etc. within river channels leading to increase in flood risk.
	Change in drainage strategy altering flows to receiving watercourses affecting flood risk, geomorphology and water quality.

Issue	Potential Effects
Surface Water Drainage	Discharges from construction activities leading to increased flows to the surface water network increasing the risk of flooding from the surface water drainage. Sediment from construction areas washed off into surface water drainage causing blockage and flooding. Construction activity leading to physical damage surface water drainage assets and causing flooding.
Wastewater	Increased flows during construction due to additional workers at the airport discharging to the wastewater network.
Water Supply	Increased demand on existing water supply/water resources to support construction activities.
Operational Phase: Water Environment	
Geomorphology	Narrowing of channel width with new/replacement concrete floodwalls. Potential increase in stream energies locally and damage to channel bed form and substrate.
	Homogeneity of channel cross-section with new culverts and new/replacement concrete floodwalls. Potential for loss of natural variance in velocities and secondary flows cells, leading to changes in velocity and geomorphological processes.
	Disruption of quantity and dynamics of flow and sediment supply, due to changes in bed and bank form, channel planform, cross-section and gradients. Potential effects due to new/replacement floodwalls, culverts, river realignment and creation of flood compensation areas.
	Increased sediment supply. Damage to channel bank form.
	Change in sediment dynamics due to changes in runoff.
	Change in physicochemical quality due to changes to natural bed and banks.
	Loss and damage to riparian zone due to new structures and/or additional access requirements for maintenance.
	Loss of natural bank form and material.
	Reduction in channel – floodplain coupling due to new/replacement floodwalls and culverts.
Water Quality	Additional de-icer being used to address increase in air traffic movements, with potential impact on surface water quality if not appropriately stored and if contaminated runoff is not treated effectively.
	Runoff from increased impermeable areas increasing sediment loading in watercourses.
	Potential for air quality effects on surface water quality, ie airborne contaminants being deposited on the ground, ultimately ending up in surface water.
	Runoff from upgraded junctions – DMRB assessment water quality (eg long-term use of herbicides/chemicals on hardstanding).
Groundwater Resources	Discharges to ground, eg from road drainage impacting groundwater flows or levels.
	Foundation/box structures, piling or cuttings/underpasses intercepting/diverting groundwater flow leading to impacts on groundwater levels and/or flow.
	Increased impermeable areas (such as car parks) leading to a reduction in recharge to shallow groundwater, impacting both groundwater levels and quality and associated

Issue	Potential Effects
	increased surface water flood risk. The assessment to consider effects on flow of any private water supplies, if present.
	Change in groundwater flow paths from sub-surface structures affecting groundwater fed ecological features (such as wetlands).
Flood Risk	Increased runoff due to additional impermeable areas increases flood risk.
	Changes to channel structures (eg culverts) reduces capacity and increases flood risk.
	Changes in drainage strategy – increased runoff leading to an increase in flood risk.
	Increased fluvial flood risk due to loss of floodplain storage arising from elements of Project within the floodplain.
	Increased flood risk due to existing surface water flow paths being interrupted, diverted or created by the Project, or due to increased impermeable area.
	New development placing more people (working and using the airport) or assets in path of potential reservoir failure flow path.
	Foundation/box structures intercepting/diverting groundwater flow leading to waterlogging and/or groundwater flooding.
Surface Water Drainage	Increased runoff due to additional impermeable areas increases flood risk.
	Changes to the A23 resulting in increased surface water runoff increasing flood risk.
Wastewater	Additional treated effluent from an increase in passenger and staff numbers impacting surface water quality if appropriate wastewater collection and treatment is not provided.
	Increased discharges to the existing foul sewerage system leading to flooding if insufficient capacity is available.
	The provision of new pumping stations creating a risk of flooding within the airport, both landside and airside (in event of failure).
Water Supply	Increase in potable water demand, requiring new infrastructure and affecting sustainability of supply from local water resource zone.

11.4.4 A summary of the effects scoped out of the assessment are presented in Table 11.4.2.

Table 11.4.2: Issues Scoped Out of the Assessment

Issue	Justification
Tidal/coastal flood risk	The airport is approximately 35 km north of the nearest coastline and ground levels are generally above 55 m above ordnance datum (AOD) and therefore are not at tidal/coastal flood risk. Accepted in the scoping response by PINS.
Groundwater impact on public water supply	There are no public water supply boreholes in the study area and the nearest Source Protection Zone for public supply boreholes is over 8 km away. Accepted in the scoping response by PINS.
Geomorphological impacts on Withy Brook and Man's Brook	The geomorphology of the watercourses is not considered to be impacted by the Project on Withy Brook and Man's Brook as they are upstream of the proposed works. No change would be expected on these watercourses. These

Issue	Justification
	watercourses are therefore scoped out given the distance and location of the watercourses and their surrounds from the proposed works.
Geomorphological impacts on Ifield Brook, Stanford Brook, Baldhorns Brook and the Mole (Hersham to River Thames confluence at East Molesey)	The geomorphology of the watercourses is not considered to be impacted by the Project on Ifield Brook, Stanford Brook and Baldhorns Brook as they are all >3 km upstream of any proposed works, and no change would be expected on these watercourses. The Mole (Hersham to River Thames confluence at East Molesey) has also been scoped out. Whilst it is an adjacent water body to the Project, it is over 60 km downstream of any proposed works. It has therefore been assumed that any impacts that the works may have on the Mole would not be significant this far downstream.

Study Area

11.4.5 The water environment study area is identified in Figure 11.4.1.

11.4.6 The study area is generally defined by a 2 km radius beyond the Project site boundary. Taking into account the nature of the Project, impacts are predicted to occur in close proximity to the Project site and it is considered that a 2 km study area would be sufficient to identify significant effects. This study area has been extended where a hydrological pathway is identified as part of the assessment phase once further data have been collected, the Project design evolves, site surveys have been undertaken and/or in response to consultation with stakeholders.

11.4.7 For geomorphological effects, a catchment study area has been defined that covers the catchments of the receptors identified and a smaller site study area has been defined based on the channels that would be directly impacted (Figure 11.2.1 in Appendix 11.9.3). The catchments of the receptors cover a combined extent of 237 km2, including the catchments of the River Mole upstream of Horley, River Mole (Horley to Hersham), Tilgate Brook and Gatwick Stream at Crawley, and Burstow Stream, which intersect the Project site. A smaller multi-reach scale study area was initially defined based on the extent of the Project site boundary. This has been further refined following the scoping stage based on a high-level review of velocity information taken from the new Upper Mole hydraulic model. The smaller study area encompasses sections of watercourses River Mole, Gatwick Stream, Crawter's Brook, Burstow Stream and Burstow Stream Tributary.

11.4.8 For flood risk and water quality, the study area cannot necessarily be defined by distance but rather the hydraulic and morphological characteristics and connectivity of water receptors. Consequently, the flood risk study area has been extended where necessary to fully assess the Project's impact upon watercourses, surface water and groundwater.

11.4.9 For wastewater the assessment of potential effects is limited to the supporting infrastructure at Gatwick. It is understood Thames Water will undertake an impact assessment of the Project on the downstream public sewerage conveyance and treatment system which will inform the ES.

11.4.10 For water supply the assessment of potential effects is limited to the water source, and does not currently cover deficiencies in water infrastructure, either internal or managed by SESW. It is understood that SESW will undertake an impact assessment of the Project on their water network

infrastructure to identify any sections requiring upgrade as a result of projected increases in water demand that would inform the ES.

Methodology for Baseline Studies

Desk Study

11.4.11 The data sources that have informed the assessment of impact are summarised in Table 11.4.3:

Table 11.4.3: Data Sources

Source	Dataset
gov.uk Open Data	Source Protection Zones* Consented discharges* Thames River Basin Management Plan
Environment Agency	Licensed abstractions and consented discharges* Water quality monitoring locations* Abstraction licence strategy (Catchment Abstraction Management Strategy) (CAMS) Pollution incidents Groundwater vulnerability and soil leaching potential* Catchment Data explorer
British Geological Survey	1:50,000 digital geology mapping (superficial and bedrock)* Groundwater flood susceptibility mapping* Web based information from GeoIndex Onshore (British Geological Survey)
Hydraulic Models	Hydraulic models are available for the fluvial network, surface water network and wastewater network. Other models will become available to inform the ES for water quality.
National Library of Scotland	Historical Ordnance Survey maps
MAGIC Website	Designated sites* Aquifer designations* Nitrate vulnerable zones*
Lead Local Flood Authorities / Local Authorities	Unlicensed groundwater and surface water abstraction (awaited) Surface water flood management plans (SWMPs) Records of local flood history (awaited) Crawley Borough Council Strategic Flood Risk Assessment 2020
Gatwick Airport Limited	Historic ground investigation data Historical water consumption data Previous water demand forecast studies Wastewater network historical operational data Pollution control system monitoring data De-icer use records Historic weather records

Note: Items marked * accessed from Geosure reports

Geomorphology

11.4.12 The watercourse catchment extents have been used to undertake a desk-based review of geomorphological conditions (Figure 11.2.1 in Appendix 11.9.3). This provides an overview of the catchments, how they currently function and a summary of information on historical changes. This information has been augmented with information gained via a walkover survey in September 2019 (see Paragraph 11.4.24).

Water Environment Regulations

11.4.13 A Preliminary Water Environment Regulation compliance assessment has been undertaken using desk study methods. The Environment Agency's Catchment Data Explorer database (2018) was used to assess water bodies present within the Project's study area as part of a desk study review. The water body information provided as part of this includes their ID numbers, designation and classification details. The Water Environment Regulation compliance mapping for groundwater risk and status assessment was also reviewed along with any other supporting data.

11.4.14 The Water Environment Regulation compliance assessment includes:

- an assessment of the existing status of the main river bodies;
- an impact assessment, which considers the potential impacts of the activities associated with the Project;
- identification of ways to avoid or minimise impacts; and
- identification of whether an activity may cause deterioration or jeopardise the water body achieving Good Ecological Status or Potential (GES or GEP). Impacts are assessed largely through qualitative methods as the further survey work will be undertaken to inform the ES.

Water Quality

11.4.15 In 2013 GAL commissioned a study to hydraulically model the surface water pollution control system, calibrate it and use it as a tool for assessing system performance and water quality in the River Mole. The model was based on the records held by GAL which are largely the result of a comprehensive survey of the network undertaken and supplemented by drawings from recent works. The calibration was undertaken against winter rainfall and de-icer use for the winters of 2011/12 and 2012/13.

11.4.16 The model was used between 2015 and 2016 to develop a new operating manual for the pollution control system, which formed the basis for a new Environment Permit (issued by the Environment Agency) for the discharge from Pond D (upper) to the River Mole.

11.4.17 Baseline de-icer use has been taken from the worst day in 2017/18 which is the coldest year since the de-icer model was validated in 2013. The winter of 2017/18 was a particularly long and cold winter, and therefore both aircraft and pavement de-icer use was above average. A de-icer use forecast model generated during the 2013/14 modelling was validated against the 2017/18 de-icer use and air traffic movements. The worst day is defined as the day in which Gatwick de-icer records show the highest load of de-icer was applied. The day on which the greatest load was applied to pavement differed to the day on which the greatest load was applied to aircraft. Therefore, the greatest pavement de-icer load was combined with the greatest aircraft de-icer load to form a theoretical worst-case day. This forms the baseline load against which development impacts were assessed as set out in Table 11.4.4.

Table 11.4.4: Baseline Pavement and Aircraft De-icer Use (Winter 2017-18)

	Date	Volume (l)	Load (kg BOD)	Concentration (BOD mg/l)
Pavement de-icer - worst day in 2017/18	27/02/2018	135,336	62,534	462,064
Aircraft de-icer - worst day in 2017/18	02/03/2018	70,040	26,265	375,000

Groundwater

11.4.18 The development of the baseline groundwater conditions has been undertaken by reference to existing information. No Project-specific ground investigation (GI) has been undertaken at this stage, although data available from existing relevant GIs have been reviewed where available. No groundwater numerical modelling has been undertaken as this was not considered proportionate to the potential impacts on or from groundwater. Data sources used in the assessment are summarised in Table 11.4.3.

Flood Risk and Surface Water Drainage

11.4.19 A baseline assessment of all sources of flood risk and surface water drainage has been undertaken. The findings are reported in a FRA for the Project (see Appendix 11.9.1). The FRA has been undertaken in accordance with the planning practice guidance (Ministry of Housing, Community and Local Government, 2019) and NPPF (Ministry of Housing, Community and Local Government, 2021). It considers baseline flood risk to the Project site from all sources, including fluvial, surface water, groundwater, flooding from reservoirs and sewer/ water supply flooding.

11.4.20 The FRA has incorporated the findings of a desk study using publicly available information and of detailed hydraulic modelling. GAL, in partnership with the Environment Agency, has recently completed the development of a fluvial hydraulic model for the Upper River Mole catchment. This includes other watercourses in the vicinity of the airport that may be impacted by the Project. This model has been used to confirm the baseline fluvial flood risk conditions. Further detail on the model is provided in the FRA (Appendix 11.9.1).

11.4.21 The assessment of surface water flood risk was undertaken using a drainage and surface model built with the InfoWorks™ ICM software. In order to validate the model for its surface water flooding performance, an existing model was rebuilt and revalidated against an extensive flow survey of 32 monitors. Further detail on the model is provided in the FRA (Appendix 11.9.1).

Wastewater

11.4.22 A computer hydraulic model of the wastewater system was built and calibrated in early 2019. It comprises a digital twin of the network serving the airport and is based mainly on asset survey data and calibrated against periods of dry and wet weather. The model was updated with peak 2018 daily passenger numbers, and the future base case scenario loading has been applied, allowing the impacts to be assessed.

Water Supply

11.4.23 Baseline consumption data have been completed through the analysis of previous forecasted demands as detailed in report ‘London Gatwick – Water Masterplan 2020 & 2028 Forecast – Full backing report’ (Gatwick Airport, 2018) and comparing predicted forecast demands with actual consumption values for 2017 and 2018, adjusting the demand curve accordingly and

extrapolating out to 2038. This has been adjusted to account for any previously proposed water efficiencies which have yet to be implemented to the current facilities.

Site-Specific Surveys

11.4.24 A geomorphological walkover survey was undertaken of publicly accessible areas within the smaller study area to develop a detailed baseline of channel characteristics on the watercourses which are potentially impacted by the Project. The survey took place in September 2019 and water levels were higher than average following a prolonged period of heavy rainfall. As a result, the bed and much of the banks were not visible. However, some information on the banks, processes and existing pressures was recorded, supplemented by photographs taken on site.

11.4.25 Manhole and sewer flow surveys have been undertaken by GAL to inform the development of the surface water drainage and water quality hydraulic model of the airport. This model is in development so has not informed the PEIR but is anticipated to be completed in time to inform the ES.

Methodology for Impact Assessment

Geomorphology

11.4.26 The potential geomorphological impacts of the Project and flood risk mitigation components have been identified for each watercourse. The baseline assessment is taken to be indicative of the current morphological condition of the watercourses. Descriptions of the potential effects of construction and operational activities have been outlined using expert judgment of fluvial geomorphological processes. A qualitative assessment of the magnitude of the impacts, both spatially and temporally, has been established with reference to GIS information, baseline conditions (including existing morphological pressures) and the Project design. The sensitivity of each watercourse to impacts is based on the water body status published on the EA's Catchment data explorer website for Water Environment (Water Framework Directive) (England and Wales) Regulations 2017. This publishes data on the status of each water body, as required by the River Basin Management Plan. For water bodies not designated under the Directive, sensitivity is assigned based on diversity of morphological features and processes, state of natural equilibrium, and extent of artificial modification or anthropogenic influence.

Water Environment Regulations

11.4.27 The Water Environment Regulation compliance assessment is a detailed assessment comprising identification of baseline parameters for each water body potentially affected by the Project; impacts to relevant water bodies as a result of Project elements, incorporation of Environment Agency mitigation measures, and a cumulative assessment of other Projects. Impacts are assessed largely through qualitative methods as survey work is ongoing at this PEIR stage.

Water Quality

11.4.28 Projected future contamination from de-icer use has been calculated from a forecast model developed in 2013 and recalibrated against 2017/18 winter de-icer use. The model has been subjected to the potential increase in de-icer use associated with forecast winter air traffic movements and increase in airfield pavement areas for the maximum design scenario in 2038. The impacts have been assessed in terms of exceedance of available capacity and potential

discharge to the water environment, compared to the baseline case taking account of the proposed mitigation works to be implemented by the Project.

11.4.29 Future de-icer use has been calculated for the 'worst winter day' described in paragraph 11.4.15. An uplift factor for pavement de-icer has been calculated assuming that 100% of any additional impermeable area generated within the airside boundary will be de-iced at the same application rate (litres per hectare) as reported in the baseline year worst day. An uplift for aircraft de-icer has been calculated based on projected increase in winter departures against the 2017-18 baseline year as summarised in Table 11.4.5.

Table 11.4.5: Estimated Future De-icer Requirements

Year	2017-18	2029	2032	2038
Winter departures	75,571	82,956	83,490	101,895
Planes de-iced	5,789	6,355	6,396	7,806
Aircraft de-icer uplift factor %	0	1.10	1.11	1.35
Airside impermeable area (ha)	265.4	Not calculated. Maximum design scenario (2038) assumed	Not calculated. Maximum design scenario (2038) assumed	271.5
Pavement deicer uplift factor (%)	0	Not calculated. Maximum design scenario (2038) assumed	Not calculated. Maximum design scenario (2038) assumed	2.31
Winter departures	75,571	82,956	83,490	101,895

11.4.30 The assessment assumes that the proportion of aircraft de-iced remains the same as the baseline, and therefore no allowance has been made for the impact of climate change potentially reducing the number of ATMs that will be de-iced due to predicted warmer winters.

Table 11.4.6: Estimated Future De-icer Use

	Date	Volume (l)	Load (kg BOD)	Concentration (BOD mg/l)	Deicer
Pavement de-icer - Worst day in 2017/18	27/02/2018	135,336	62,534	462,064	Mix of Konsin and Safegrip ECO2 used in 2017/18
Aircraft deicer - worst day in 2017/18	02/03/2018	70,040	26,265	375,000	Ethylene Glycol
Additional Northern Runway 2038 pavement de-icer - worst day in 2017/18	27/02/2018	24,315	5,349	220,000	Operational changes mean that only Safegrip ECO2 is used on pavements

	Date	Volume (l)	Load (kg BOD)	Concentration (BOD mg/l)	Deicer
Additional Northern Runway 2038 aircraft de-icer - worst day in 2017/18	02/03/2018	24,514	9,193	375,000	Ethylene Glycol
Total Northern Runway 2038 pavement de-icer - worst day in 2017/18	27/02/2018	159,651	35,123	220,000	Operational changes mean that only Safegrip ECO2 is used on pavements
Total Northern Runway 2038 aircraft de-icer - worst day in 2017/18	02/03/2018	94,554	35,458	375,000	Ethylene Glycol
Pavement de-icer - Worst day in 2017/18	27/02/2018	135,336	62,534	462,064	Mix of Konsin and Safegrip ECO2 used in 2017/18

11.4.31 Therefore the total volume of de-icer on the worst winter day increases by 24 m^3, and the total load decreases by 27,076kg BOD.

11.4.32 A detailed water quality model, based on the verified surface water model, is in development, and will be used to inform the assessment of impacts in the ES. The model has been revalidated against a flow survey that was completed in October 2019, and is currently being validated against observed water quality data.

Groundwater

11.4.33 Groundwater impacts have been evaluated based on desk study information, including historic GI surveys. Information on private water supplies and historic groundwater flooding events has been requested and is awaited from Crawley Borough Council. However, based on the Strategic Flood Risk Assessment (SFRA) for Crawley Borough (Crawley Borough Council, 2020) it is understood that there have been no groundwater flooding events recorded in the study area.

11.4.34 To develop an overview of the groundwater regime a summary (qualitative) conceptual site model has been developed to set the context of groundwater within the overall water environment and to support the groundwater impact assessment. The conceptual site model has been used to inform the sensitivity of groundwater as a resource and determine the significance of the effects.

11.4.35 The risk from groundwater flooding has been included in the FRA in Appendix 11.9.1 and summarised in Section 11.9.

Flood Risk and Surface Water Drainage

11.4.36 An assessment of Project's impact on flood risk has been undertaken and the findings have been reported in the FRA (Appendix 11.9.1). The assessment is primarily based on site-specific fluvial hydraulic modelling that has been developed by GAL, in partnership with the Environment Agency. The Project has been modelled by adding it to the baseline version of the hydraulic

model and re-running the model. The modelling results have been used to assess the magnitude of impact of the Project on fluvial flood risk.

11.4.37 Results from the validated surface water drainage model have been utilised in combination with Environment Agency mapping to provide an assessment of the impact of the Project on surface water drainage flood risk.

11.4.38 At this stage, there is no modelling data available for joint fluvial and surface water flooding events. However, fluvial hydraulic modelling assumes that watercourses receive all catchment flows (including surface water runoff). Similarly, the location of watercourses has been considered within the surface water drainage model.

11.4.39 It has not been possible to quantify potential Project effects on groundwater and water infrastructure flood risk, consequently these assessments are qualitative in nature. Further details are included in Appendix 11.9.1.

Wastewater

11.4.40 The assessment of impacts has been undertaken using a calibrated computer hydraulic model of the wastewater sewerage system. The model has been subject to the projected increases in discharges during the various stages of the Project and the impacts assessed in terms of exceedance of available capacity and consequent flooding compared to the baseline case, taking account of the proposed mitigation works to be implemented as part of the Project.

Water Supply

11.4.41 An assessment of the impact on water supply infrastructure has been undertaken by assessing the Project elements that will increase water consumption through increased passengers and temporary construction workforce combined with potential efficiencies to be implemented during construction. This has been combined with updated baseline consumption information, as detailed in paragraph 11.4.23. The updated consumption values have been supplied to SESW to confirm the water source contains sufficient capacity for the required water consumption.

Assessment Criteria and Assignment of Significance

11.4.42 The water environment encompasses a number of disciplines covering all aspects of the water cycle. For each of these the sensitivity of receptors and magnitude of impact of the Project have been defined. These have then been combined to determine the significance of the effect of the Project (based on the elements identified in Chapter 5: Project Description) on each water element. The criteria for each of these assessments are included in Table 11.4.7, Table 11.4.8 and Table 11.4.9. The following sections explain the information utilised and approach to determine the significance of the effect.

11.4.43 The definition of effect and impact in terms of the EIA process are drawn from the glossary of the Highways Agency DMRB (Highways Agency *et al*, 2008), which provides general guidance:

- Impact: Change that is caused by an action; for example, land clearing (action) during construction which results in habitat loss (impact).
- Effect: Term used to express the consequence of an impact (expressed as the ‘significance of the effect’), which is determined by correlating the magnitude of the impact to the importance, or sensitivity, of the receptor or resource in accordance with defined significance

criteria. For example, land clearing during construction results in habitat loss (impact), the effect of which is the significance of the habitat loss on the ecological resource.

11.4.44 Impact magnitude takes into account the impact duration. The following definitions have been adopted for the PEIR:

- short term: A period of months, up to one year;
- medium term: A period of more than one year, up to five years; and
- long term: A period of greater than five years.

11.4.45 The significance of an effect is determined based on the sensitivity of a receptor and the magnitude of an impact. This section describes the criteria applied to characterise the sensitivity of receptors and magnitude of potential impacts. The terms used to define magnitude and sensitivity are based on and have been adapted from those used in DMRB LA113 (Highways England *et. al.,* 2020), which is described in further detail in Chapter 6: Approach to Environmental Assessment. The significance, sensitivity and magnitude have been assessed for each water discipline (see paragraph 11.1.1) and then combined into a single classification for the following water receptors:

- surface water;
- groundwater;
- flood risk; and
- water infrastructure.

11.4.46 These receptors, collectively, cover the potential impacts related to each topic area considered. The assessment of significance of the effect has been undertaken for the Project with embedded mitigation taken into consideration.

Receptor Sensitivity/Value

11.4.47 The sensitivity of receptors has been classified for each water environment discipline in accordance with the criteria set out in Table 11.4.7. As part of the assessment there are a number of potential effects which would arise from the risk of an impact rather than a certain consequence of the Project. An example of this is the risk of a pollution incident. The methodology takes account of the fact that in the worst case the consequence of these types of risk on relevant receptors could be high but the likelihood of the impact occurring would be expected to be low.

Table 11.4.7: Sensitivity Criteria

Sensitivity	Water Environment Receptor	Criteria
Very High	Surface water	Watercourse having a high (or potential to achieve high) Water Environment Regulations classification shown in a River Basin Management Plan (RBMP) and/or international designation related to wet features (eg a riverine Special Area of Conservation (SAC) or Special Protection Area (SPA)). Non Water Environment Regulations classified watercourses may be applicable if they demonstrate qualities such as: a channel in stable equilibrium and exhibiting a range of natural morphological features (such as pools, riffles and bars); diversity in morphological processes reflects unconstrained natural function; free from artificial modification or anthropogenic influence.
	Groundwater	Principal aquifer providing a strategic and regionally important resource of high quality and/or provides primary support to a watercourse or site, including groundwater dependent terrestrial ecosystems (GWDTE), protected under international legislation. Source Protection Zone (SPZ)1 of a public water supply.
	Flood risk	Essential infrastructure or highly vulnerable development (as defined in the NPPF flood risk vulnerability classification); essential transport infrastructure, essential utility infrastructure, wind turbines, emergency services stations and dispersal points required to be operational during a flood, basement dwelling, caravans and mobile homes, and installations requiring hazardous substances consent.
	Water infrastructure	Water use or infrastructure supporting human health, economic activity or environmental protection at a regional scale. For example, an integrated water resources system that serves the whole of the South East of England.
High	Surface water	Watercourse having a good (or potential to achieve good) Water Environment Regulations classification shown in a RBMP and/or national designation related to wet features (eg a riverine Site of Special Scientific Interest (SSSI)). Non Water Environment Regulations classified watercourses may be applicable if they demonstrate qualities such as: a channel achieving near-stable equilibrium and exhibiting a range of natural morphological features (such as pools, riffles and bars); diversity in morphological processes reflects relatively unconstrained natural function, with minor artificial modification or anthropogenic influence.
	Groundwater	Principal aquifer providing locally important resource or supporting a river ecosystem. Groundwater supports a GWDTE with a national conservation designation. SPZ2/SPZ3 of a public water supply.

Sensitivity	Water Environment Receptor	Criteria
	Flood risk	More vulnerable development (as defined in the NPPF); hospitals, residential institutions, dwellings, non-residential uses for health services, landfill sites and sites used for holiday or short-let caravans/camping.
	Water infrastructure	Water use or infrastructure supporting human health, economic activity or environmental protection at a regional scale at a nationally significant city scale.
Medium	Surface water	Watercourse having a less than good (or potential to achieve less than good) Water Environment Regulations classification shown in a RBMP and/or local designation related to wet features (eg a riverine Local Nature Reserve (LNR)). Non Water Environment Regulations classified watercourses may be applicable if they include channels currently showing signs of historical or existing modification and artificial constraints, and/or attempting to recover to a natural equilibrium and exhibiting a limited range of natural morphological features (such as pools, riffles and bars).
	Groundwater	A secondary aquifer providing water for agricultural or industrial use with limited connection to surface water and/or which provides support to a GWDTE of regional importance.
	Flood risk	Less vulnerable development (as defined in the NPPF); emergency services stations, commercial units, agricultural land, other waste treatment, minerals working, water treatment works and Sewage Treatment Works (if adequate pollution control is in place).
	Water infrastructure	Water use or infrastructure supporting human health, economic activity or environmental protection at a regional scale. For example, Crawley Sewage Treatment Works.
Low	Surface water	Minor local watercourses not having a Water Environment Regulations classification shown in a RBMP and no designated features. A channel currently showing signs of extensive historical or existing modification and artificial constraints. There is no evidence of diverse fluvial processes and morphology and active recovery to a natural equilibrium.
	Groundwater	A secondary aquifer of poor water quality and/or very low permeability that make exploitation of the aquifer for supply unfeasible, or which provides support to a GWDTE of local importance.
	Flood risk	Water compatible development (as defined in the NPPF); flood control infrastructure, marine facilities (docks, marinas etc), amenity

Sensitivity	Water Environment Receptor	Criteria
		open space and recreation facilities, and lifeguard/coastguard stations.
	Water infrastructure	Water use or infrastructure supporting human health, economic activity or environmental protection at a regional scale at a local or individual business or property scale. For example, a drinking water pumping station serving a hamlet or village.
Negligible	Surface water	Minor ephemeral drains and channels.
	Groundwater	Unproductive strata. No groundwater connection to local ecosystems or where changes to the groundwater regime are not expected to have an impact on local ecology.
	Flood risk	Water compatible development (as defined in the NPPF).
	Water infrastructure	Water use or infrastructure not supporting human health, economic activity or environmental protection.

Magnitude of Impact

11.4.48 The magnitude of impact on the water environment has been assessed based on the degree of change created by the Project and the impact this will cause on the receptor. Table 11.4.8 summarises the assessment criteria.

Table 11.4.8: Impact Magnitude Criteria

Magnitude of Impact	Water Environment Receptor	Criteria
High Adverse	Surface water	Loss or extensive change to a fishery. Loss of regionally important public water supply. Loss or extensive change to an internationally designated nature conservation site. Works would adversely impact the geomorphology on a waterbody scale. Reduction in water body Water Environment Regulations status.
	Groundwater	Loss of, or extensive change to, an aquifer. Loss of regionally important water supply. Loss of, or extensive change to GWDTE or baseflow contribution to protected surface water bodies. Reduction in water body Water Environment Regulations classification. Loss or significant damage to major structures through subsidence or similar effects.
	Flood risk	Increase in peak flood level (>100 mm).
	Water infrastructure	Loss of regionally important water supply. High risk of flooding from foul sewerage system (>5 incidents per annum).

Magnitude of Impact	Water Environment Receptor	Criteria
		Total failure of asset. Major outage. Major regulatory risk (eg significant risk of failure of Upper Tier permits, or of failing to achieve water supply quality standards). Likely to cause CAT1 pollution (see 11.4.49). Exceeds installed capacity of asset.
Medium Adverse	Surface water	Partial loss in productivity of a fishery. Degradation of regionally important public water supply or loss of major commercial/industrial/agricultural supplies. Works would adversely impact geomorphology of the waterbody at a multi-reach scale. Contribution to reduction in water body Water Environment Regulations status.
	Groundwater	Partial loss or change to an aquifer. Degradation of regionally important public water supply or loss of significant commercial/ industrial/agricultural supplies. Partial loss of the integrity of GWDTE. Contribution to reduction in water body Water Environment Regulations classification. Damage to major structures through subsidence or similar effects or loss of minor structures.
	Flood risk	Increase in peak flood level (50-100 mm).
	Water infrastructure	Degradation of regionally important public water supply. High risk of flooding from foul sewerage system (>5 incidents per annum). Temporary outage of asset. Moderate regulatory risk (eg moderate risk of failing). Reduced ability to achieve agreed performance standards (eg Water pressure requirements). Potential to cause CAT2 pollution.
Low Adverse	Surface water	Minor effects on water supplies and/or river quality. Works would adversely impact the geomorphology of the waterbody on a reach scale.
	Groundwater	Minor effects on an aquifer (flow, levels or quality), GWDTEs, abstractions and structures.
	Flood risk	Increase in peak flood level (10-50 mm).
	Water infrastructure	Minor effects on regional water supply. Low risk of flooding from foul sewerage system (<2 incidents per annum). Reduction in performance of asset, marginal regulatory compliance. Reduced ability to achieve level of service standards (eg Water pressure requirements).

Magnitude of Impact	Water Environment Receptor	Criteria
		Potential to cause CAT3 pollution.
Negligible Adverse	Surface water	Measurable but insignificant adverse effects on flow, supplies or quality. Works would adversely impact the geomorphology of the waterbody on a local scale.
	Groundwater	No measurable impact upon an aquifer and/or groundwater receptors.
	Flood risk	Negligible increase to peak flood level (≤10 mm).
	Water infrastructure	No measurable impact on regional water supply. Negligible risk of flooding from wastewater system (<1 incident per annum). Minor reduction in performance of asset, but still achieves regulatory standards.
No Change	Surface water	No loss or alteration of characteristics, features or elements; no observable impact in either direction.
	Groundwater	No loss or alteration of characteristics, features or elements; no observable impact in either direction.
	Flood risk	Due to the tolerance of hydraulic models used to assess flood risk impacts, it is often not possible to distinguish between No Change and Negligible impacts. Therefore, where model results are used to assess change in flood risk, negligible is used where the model is predicting No Change.
	Water infrastructure	No loss or alteration of characteristics, features or elements; no observable impact in either direction.
Negligible Beneficial	Surface water	Measurable but insignificant benefits on flow, supplies or quality. Works would beneficially impact the geomorphology of the waterbody on a local scale.
	Groundwater	Slight measurable positive effect (eg increased recharge) upon an aquifer and/or groundwater receptors.
	Flood risk	Negligible reduction in peak flood level (≤10mm).
	Water infrastructure	Slight measurable positive effect on regional water supply. Small decrease in demand on foul sewerage system. Minor improvement in performance of asset, but still achieves regulatory standards.
Low Beneficial	Surface water	Minor improvements in surface water quality (eg through removal/mitigation of a poor-quality discharge). Works would beneficially impact the geomorphology of the waterbody on a reach scale.
	Groundwater	Reduction of groundwater hazards to existing structures. Reductions in waterlogging and groundwater flooding.
	Flood risk	Reduction in peak flood level (10-50 mm).
	Water infrastructure	Minor measurable positive effect on regional water supply. Medium decrease in demand on foul sewerage system.

Magnitude of Impact	Water Environment Receptor	Criteria
		Increase in performance of asset; bring non-compliant asset into compliance. Improved ability to achieve LOS standards (eg water pressure requirements). Reduced risk of CAT3 pollution
Medium Beneficial	Surface water	Works would beneficially impact the geomorphology of the waterbody on a multi-reach scale. Contribution to improvement in water body Water Environment Regulations classification.
	Groundwater	Contribution to improvement in water body Water Environment Regulations classification. Improvement in water body CAMS (or equivalent) classification. Support to significant improvements in damaged GWDTE.
	Flood risk	Reduction in peak flood level (50-100 mm).
	Water infrastructure	Measurable positive effect on regional water supply. Significant decrease in demand on foul sewerage system. Reduced risk of outage of asset. Brings marginally compliant asset into regulatory compliance. Improved ability to achieve agreed performance standards (eg water pressure requirements). Reduced risk of CAT2 pollution.
High Beneficial	Surface water	Removal of existing polluting discharge or removing the likelihood of polluting discharges occurring to a watercourse. Works would beneficially impact the geomorphology of the waterbody on a waterbody scale. Improvement in water body Water Environment Regulations classification.
	Groundwater	Removal of existing polluting discharge to an aquifer or removing the likelihood of polluting discharges occurring. Recharge of an aquifer. Improvement in water body Water Environment Regulations classification.
	Flood risk	Reduction in peak flood level (>100 mm).
	Water infrastructure	Significant positive effect on regional water supply. Significant decrease in demand on foul sewerage system and sewage treatment facilities. Significantly reduced risk of outage of asset. Brings non-compliant asset into regulatory compliance. Significantly improved ability to achieve agreed performance standards (eg water pressure requirements). Significantly reduced risk of CAT1/2 pollution.

11.4.49 Pollution categories described above are based on the Ofwat / Environment Agency Common Classification Scheme (Incidents and their Classification: the Common Incident Classification Scheme, Environment Agency 2016):

- CAT1 – major, serious, persistent and/or extensive impact or effect on the environment, people and/or property.
- CAT2 – significant impact or effect on the environment, people and/or property.
- CAT3 – minor or minimal impact or effect on the environment, people and/or property.
- CAT4 – substantiated incident with no impact.

Significance of Effect

11.4.50 The significance of the effect upon the water environment has been determined by taking into account the sensitivity of the receptor and the magnitude of the impact. The method employed for this assessment is presented in Table 11.4.9. Where a range of significance levels are presented, the final assessment for each effect is based upon expert judgement.

11.4.51 In all cases, the evaluation of receptor sensitivity, impact magnitude and significance of the effect has been informed by professional judgement and is underpinned by narrative to explain the conclusions reached. The significance of the effect is assessed after consideration of proposed mitigation that would be in place.

11.4.52 For the purpose of this assessment, any effects with a significance level of minor or less are not considered to be significant in terms of the Infrastructure Planning Environmental Impact Assessment (EIA) Regulations 2017, as amended (referred to as the 'EIA Regulations').

11.4.53 However, specifically for flood risk, national planning policy requires that no increase in flood risk occurs elsewhere due to the Project. Therefore, any increase in flood risk to third parties due to the Project that is not of 'negligible' magnitude would be considered to require mitigation.

Table 11.4.9: Assessment Matrix for Assigning Significance of Effect

Sensitivity	Magnitude of Impact (Adverse or Beneficial)				
	No Change	Negligible	Low	Medium	High
Negligible	No change	Negligible	Negligible or Minor	Negligible or Minor	Minor
Low	No change	Negligible or Minor	Negligible or Minor	Minor	Minor or Moderate
Medium	No change	Negligible or Minor	Minor	Moderate	Moderate or Major
High	No change	Minor	Minor or Moderate	Moderate or Major	Major or Substantial
Very High	No change	Minor	Moderate or Major	Major or Substantial	Substantial

11.4.54 A description of the significance levels, assigned taking account of proposed mitigation, is as follows:

- Substantial: Only adverse effects are normally assigned this level of significance. They represent key factors in the decision-making process. These effects are generally, but not exclusively, associated with sites or features of international, national or regional importance that are likely to suffer a most damaging impact and loss of resource integrity. However, a major change in a site or feature of local importance may also enter this category.
- Major: These beneficial or adverse effects are considered to be very important considerations and are likely to be material in the decision-making process.
- Moderate: These beneficial or adverse effects may be important but are not likely to be key decision-making factors. The cumulative effects of such factors may influence decision-making if they lead to an increase in the overall adverse effect on a particular resource or receptor.
- Minor: These beneficial or adverse effects may be raised as local factors. They are unlikely to be critical in the decision-making process but are important in enhancing the subsequent design of the Project.
- Negligible: No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

11.5 Assumptions and Limitations of the Assessment

11.5.1 The PEIR includes the following key limitations as part of the assessment for the water environment:

- A preliminary Water Environment Regulations compliance assessment has been undertaken at this stage of the Project and will be updated to a full assessment to inform the ES.
- The potential influence of groundwater flooding on flood risk from other sources (for example sewer flooding) has been considered qualitatively within the FRA.
- No site visit has been undertaken to inform the groundwater impact assessment as it was considered there were no observations of value that could be made at this time.
- No GI specific to the groundwater assessment has been undertaken.
- The Project design development is ongoing at the time of writing this assessment. Further design development is likely through the EIA process and the assessment will be updated for the ES.
- At this stage, the finished elevations of the development are not finalised, and therefore it is not possible to develop a full post development drainage model which is conceptual in nature. A more detailed assessment will be undertaken at a later design stage to inform the ES. Therefore, the mapped surface water flood extents and depths that are included in supporting figures of the FRA should only be used as an indication of the scale of the change in surface water flooding. In particular, the alterations in ground levels within the airfield due to the Project have not been assessed as the model is still being prepared. Therefore, the exact locations of flooding cannot be verified. The surface water flood extents and depths will be updated following the revalidation against the flow survey and will be taken into account within the FRA accompanying the application for development consent.
- At this stage, the design of proposed flood mitigation measures is subject to discussion with the LLFA and/or the Environment Agency. Therefore, details regarding their location and arrangements are subject to change.
- High water levels during the geomorphology walkover survey meant the banks and bed were not visible in most areas, however sufficient information was obtained to fully assess effects of relevance to this study.

- No geomorphological walkover has been undertaken on Burstow Stream as it was originally scoped out of the assessment. A further site visit to collect detailed baseline information will be undertaken for the ES stage.
- The detailed de-icer water quality is being validated. The assessment is based on what mitigation is needed to prevent any increase in volume or load of de-icer being discharged to the environment. The detailed modelling may indicate that there are other operational solutions to de-icer water quality management than the structural measures proposed in this report.

11.5.2 Key assumptions made at this stage of assessment include:

- New discharges during the operational phase to watercourses will be at or better than greenfield runoff rates.
- Scour protection will be designed for the outfalls using soft engineering where possible.
- Where there may be potential impacts on groundwater (for example by constraining or limiting groundwater flow, or the effects of dewatering) there are engineering solutions that can be embedded within the development and its construction to mitigate these impacts.
- Although much of the evidence for the groundwater assessment is based on historic information, it is assumed, given the relatively slow rate of long-term change in groundwater conditions, that this data may be used to represent the current (present day) baseline.
- The amount of pavement de-icer used per unit of airfield, and per air traffic movements (broken down by aerodrome reference code) during the operational phase will remain the same.
- Where there may be potential impacts to Water Environment Regulation water bodies, there are engineering and/or design solutions that can be implemented to reduce the potential deterioration to classification status.
- Thames Water will complete an assessment of the impact of an increase in passenger numbers as a result of the Project on water treatment capacity at Crawley and Horley that would inform the ES. GAL has identified a potential location for a new treatment works adjacent to the existing Crawley Sewage Treatment Works, should there be insufficient capacity for the Project at the two existing works that receive flows from Gatwick. The impact of these works has not been assessed as part of this chapter, however the Sewage Treatment Works is considered as part of the cumulative assessment. This PEIR includes an assessment on the Gatwick wastewater sewerage network capacity, not the treatment works.
- Winter 2017/18 is adopted as a good baseline for a cold winter year and climate change does not impact the volume of pavement or aircraft de-icer used.
- The airfield de-icer strategy does not change (eg there are no specific de-icing pads, the application rate of de-icer per aircraft and per impermeable area do not change and the rate of recovery of aircraft de-icer at stands does not change).
- Where surface access improvements are proposed, these would be accompanied by drainage ensuring that surface water runoff would be safely managed and restricted to pre-development or, where possible, greenfield runoff rates.
- Mapping of the consequences of the failure of the Gatwick Stream Flood Storage Area embankment will be modelled to inform the ES. It is anticipated that the inspection and maintenance regime would result in a very low likelihood of failure.

11.5.3 Despite the limitations listed in 11.5.1 and the requirement to adopt the assumptions listed, it is considered that sufficient information was available to provide a preliminary assessment of

environmental effect of the Project. The assessment will be updated with additional information to inform the assessment presented in the ES.

11.6 Baseline Environment

Current Baseline

11.6.1 Key water environment features relevant to the Project are identified in Figure 11.6.1.

Geomorphology

11.6.2 A geomorphological baseline was established for the Mole, Gatwick Stream, Crawter's Brook and Burstow Stream Tributary and Burstow Stream (Figure 11.6.1). These watercourses were deemed to have the potential to be directly or indirectly impacted by the Project. Design changes in terms of proposed flood mitigation measures between the scoping stage and the PEIR stage have resulted in the following being scoped out of the assessment, given that they are no longer considered to be impacted by the Project: Mole (Horley to Hersham), Withy Brook and Man's Brook.

11.6.3 The catchment terrain of the scoped in watercourses is dominated by the Low Weald topography of the Wealden Basin, and underlain by clay of the Wealden Group. Surface geology mainly comprises alluvium and river terrace sands and gravels.

11.6.4 The Mole (upstream of Horley) catchment area is approximately 30 km2 and includes the urban areas of Crawley and Three Bridges, and Gatwick Airport (Environment Agency, 2018). The Mole forms at the confluence of the tributaries of Ifield Brook and Baldhorns Brook, north of Crawley, where it flows north eastwards through mainly rural land, receiving field drain runoff. This section of the watercourse has a naturally meandering planform and wide channel of 5 metres. At the southern perimeter of Gatwick Airport, the Mole is joined by Crawter's Brook. Crawter's Brook is a narrow stream of 2 metres which rises in Tilgate Forest in the south and flows northwards through Crawley via a network of culverts and open channels towards the southern perimeter of the airport. Crawter's Brook was realigned westwards along a straightened channel to meet the Mole. The Mole is then culverted under the existing main and northern runways. North of these, the Mole re-emerges from the culvert and is joined from the west by Man's Brook, a small 2-4 metre wide stream which rises at Tilgate and flows eastwards through agricultural land. The Mole is also joined by Westfield Stream, a small realigned and heavily modified channel which rises northwest of the runway, connecting to the Mole via a balancing pond. The Mole has been realigned around the northern perimeter of the airport, confined in a low valley between the airport infrastructure and urban residential areas. The Mole is culverted under the A23, at which point it meets the confluence with Gatwick Stream, forming the Mole (Horley to Hersham).

11.6.5 Gatwick Stream is a tributary of the Mole. It rises in Worth Forest below Clays Lake in West Sussex and flows northwards through Tilgate Forest, through Maidenbower, Three Bridges and Tinsley Green to the confluence with the Mole. Tilgate Brook is a tributary of Gatwick Stream, about 300 metres in length. Crawley sewage treatment works is located adjacent to the Gatwick Stream, downstream of Crawley. Gatwick Stream is approximately 8 km in length, with a catchment area of 14 km2 (Environment Agency, 2018). The river planform is sinuous as it flows through Tinsley Green: a mixture of wooded area and parkland. The width of the channel typically measures 4-5 metres along this section. Downstream of the sewage treatment works, the watercourse passes through a culvert under the London to Brighton mainline railway and flows

northwards along an engineered straightened course adjacent the eastern airport perimeter. The watercourse is narrower at this point with an approximate width of 3 metres. The watercourse is culverted under the South Terminal building and under Airport Way, where it re-emerges into Riverside Garden Park, to the north of the A23, as a 900 metre long section of natural meandering channel. Downstream, the watercourse is straightened as it flows between the A23 and residential areas, before joining the Mole to the east of the A23.

11.6.6 Burstow Stream is a tributary of the Mole. It rises at Crawley Down in Sussex, flowing through mostly rural areas and the urban area of Copthorne, joining the Mole at Horley. Burstow Stream is approximately 2 km away from the airport, however, a small section which flows under the M23 motorway and a tributary is within the study area. Burstow Stream Tributary is a tributary of the Burstow Stream. It is a small channel fed by several drains from agricultural land and road drains. The stream is typically less than 2 metres in width. Current OS mapping indicates the stream originates south of Horley as a drain along Balcombe Road and is culverted under the M23 motorway. The stream flows mostly over ground through the residential area south of Horley.

11.6.7 Further details of the watercourses' evolution and detailed channel characteristics ascertained from the walkover survey are included in Appendix 11.9.3.

Water Environment Regulations

11.6.8 The baseline for Water Environment Regulations is set as the present day using data from 2019, as supplied by Environment Agency's Catchment Data Explorer database (2018). The water bodies assessed in the Water Environment Regulations compliance assessment are:

- Mole upstream of Horley (water body ID number GB106039017481);
- Tilgate Brook and Gatwick Stream at Crawley (GB106039017500);
- Burstow Stream (GB106039017520);
- Mole (Horley to Hersham) (ID: GB 106039017621); and
- Groundwater water body Copthorne Tunbridge Wells Sands (GB40602G602400).

11.6.9 These are identified in Figure 11.2.1 and Appendix 11.9.2 (Water Environment Regulations rivers with river labels).

11.6.10 The Mole upstream of Horley is classed as Heavily Modified with a current potential status of Moderate, and overall objective of Good. As stated in the Water Environment Regulations compliance assessment and on the Environment Agency's Catchment Data Explorer database (2018), there are no protected areas within Mole upstream of Horley. The Mole is considered to be of high sensitivity.

11.6.11 Tilgate Brook and Gatwick Stream at Crawley is Heavily Modified with a current potential status of Moderate, and an overall objective of Moderate. As stated in the Water Environment Regulations compliance assessment, and on Environment Agency's Catchment Data Explorer (2018), River Mole Urban Wastewater Treatment Directive is a linked protected area within the water body. This water body is considered to be of high sensitivity.

11.6.12 Burstow Stream is a river not designated as artificial or Heavily Modified. Its current status is Bad with an overall objective of Poor by 2027. There are two Nitrates Regulations sites within the water body. This water body is considered to be of medium sensitivity.

11.6.13 The River Mole (Horley to Hersham) is a river not designated as artificial or Heavily Modified. Its current status is Moderate, with an overall objective of Moderate. As stated in the Water Environment Regulations compliance assessment, and on Environment Agency's Catchment Data Explorer (2018), there are three Nitrates Regulations sites, River Mole Urban Wastewater Treatment Directive, and Mole Gap to Reigate Escarpment Habitats Regulations site within the water body. This water body is considered to be of high sensitivity.

11.6.14 The groundwater body is Copthorne Tunbridge Wells sands. Its current status is Good with an overall objective of achieving Good. This is considered to be of high sensitivity.

11.6.15 A summary of the surface waterbody Water Environment Regulations information is presented in Table 11.6.1.

Table 11.6.1: Surface Waterbody Water Environment Regulations Summary Information

Water Environment Regulations Waterbody	Mole (upstream of Horley)	Tilgate Brook and Gatwick Stream	Burstow Stream	Mole (Horley to Hersham)
River Basin Management Plan (RBMP)	Thames River Basin District RBMP: 2015	Thames River Basin District RBMP: 2015	Thames River Basin District RBMP: 2015	Thames River Basin District RBMP: 2015
Operational Catchment	Mole Upper Trib	Mole Upper Trib	Mole Upper Trib	Lower Mole and Rythe
Waterbody ID	GB106039017481	GB106039017500	GB106039017520	GB106039017621
Classed as Heavily Modified Waterbody	Yes	Yes	No	No
Water Environment Regulations Overall Status (2019)	Moderate	Moderate	Bad	Moderate
Physicochemical Status	Moderate	Good	Moderate	Moderate
Chemical Status	Fail	Fail	Fail	Fail
Hydromorphological Quality Elements	Supports Good	Supports Good	Supports Good	Supports Good

Water Quality

11.6.16 The baseline for water quality is based on the baseline for Water Environment Regulations status, using the same water bodies as receptors. Water Environment Regulations data are used as the baseline from which to assess future changes.

11.6.17 The airfield surface water drainage and pollution control system is included in Figure 11.6.7.

11.6.18 The western extent of the airfield drains to Pond A. During non de-icer contamination periods, surface water discharges through Pond A to the River Mole with no attenuation. When de-icer is in use (either pavement or aircraft), a penstock on the discharge point is closed, and the contaminated runoff is routed to Pond M.

11.6.19 Pond M receives flows from the Pond M Drainage catchment, including pumped flows from Pond A. If the water quality is better than a specific biochemical oxygen demand (BOD) and pH threshold, the runoff is pumped into the western 'clean' compartment of Pond M, attenuated, and discharged at greenfield runoff rates to the River Mole. If the water quality is worse than the threshold, it is retained in the eastern 'dirty' compartment of Pond M, before being pumped onwards and then drained under gravity towards Pond D.

11.6.20 Pond D is the key drainage pond receiving the majority of runoff from Gatwick. Runoff from the Pond D catchment drains under gravity to Pond D (lower) and is then raised by three Archimedes Screws. If the water quality meets the required standard, runoff enters Pond D (upper) via a series of separator channels and discharges to the River Mole. Discharge to the River Mole is at a consented rate, controlled by a series of hydrobrakes and pumps. The actual rate of discharge is determined by the volume of flow in the River Mole. Higher flow rates in the River Mole permit a higher discharge rate from Pond D (upper).

11.6.21 When the runoff meets the minimum required water quality standard of less than 10 mg/l BOD, Pond D discharges to the River Mole. When water quality is worse than the required standard, the pond discharges to the 'dirty' water pumped main which conveys runoff for further treatment and temporary storage at two long term storage lagoons with storage capacities of 220,000 m3 and 100,000 m3 and then ultimately to Crawley sewage treatment works operated by Thames Water. There are restrictions placed on the peak flow that can be transferred to the sewage treatment works under a trade effluent consent agreed with Thames Water.

11.6.22 There are two permitted environmental conditions where there may be a discharge of worse than the 10 mg/l BOD standard from Pond D (upper) to the River Mole. The first is if the total capacity of the two long term storage lagoons has been exceeded. The second long term storage lagoon was constructed in 2011 with a design to ensure that capacity was never exceeded even in a particularly cold and wet winter. The capacity has never been exceeded since the lagoon was constructed, and that period includes the very cold winter of 2017/18. Secondly, if the capacity of the conveyance system between Pond D (lower) and the long term storage lagoons is exceeded and Pond D lower was full, there will be a discharge to the Mole that could exceed the 10 mg/l BOD threshold. This type of discharge is classed as an Emergency Discharge by Gatwick and is needed to protect North Terminal / Apron, the fuel farm and the cargo and waste centre facilities from flooding.

11.6.23 The River Mole at the point of discharge is classified as Good Potential Status therefore the existing discharge arrangement does not impact on water quality.

Groundwater

11.6.24 The geology and hydrogeology of the site are set out in Chapter 10: Geology and Ground Conditions, although key information is repeated here to provide the context for the assessment of impact for groundwater resources. Mapping of both superficial deposits and bedrock strata is provided in Figure 11.6.8.

Geology and Hydrogeology

11.6.25 Groundwater occurs beneath the site in both superficial deposits of Alluvium and River Terrace Deposits (RTD) and in the Upper Tunbridge Wells Sand Formation, at depth beneath the site. Groundwater is also present in upper weathered layers of the Weald Clay Formation.

11.6.26 Alluvium is recorded across several parts of the study area, and comprises a heterogeneous mixture of clay, silt, sand and gravel. RTD are recorded beneath parts of the study area and comprise sand and gravel. The deposits are likely to continue beneath the mapped Alluvium, giving them an area of subcrop. Both Alluvium and RTD are largely associated with existing or historic watercourses. These associations are summarised in Table 11.6.2.

Table 11.6.2: Association between Superficial Deposits and Watercourses

Watercourse	Geological Association
South River Mole	Alluvium, River Terrace Deposits 1, River Terrace Deposits 2
North River Mole	Alluvium, River Terrace Deposits (Undifferentiated)
Historic River Mole north	Alluvium, River Terrace Deposits 1
Historic River Mole east	River Terrace Deposits 1, River Terrace Deposits 2
Diverted River Mole	Alluvium, None
South Crawter's Brook	Alluvium
Channelised Crawter's Brook	None
Historic Crawter's Brook	Alluvium, River Terrace Deposits 1
Gatwick Stream	Alluvium, River Terrace Deposits 1, River Terrace Deposits (Undifferentiated)
Burstow Stream	Alluvium, River Terrace Deposits (Undifferentiated)

11.6.27 The majority of the study area is underlain by bedrock of the Weald Clay Formation, principally a mudstone but with layers of clay and ironstone recorded to the west and south of the airport. Outcrop of the underlying Upper Tunbridge Wells Sand Formation occurs in the south east of the study area, comprising of interbedded sandstone and siltstone, and a single thick band of mudstone. The Upper Tunbridge Wells Sand Formation extends beneath the Weald Clay Formation in subcrop.

11.6.28 The Environment Agency aquifer designations for each of the different identified geological units are summarised in Table 11.6.3.

Table 11.6.3: Aquifer Designations and Lithological Description

Geological Unit	Lithology	Aquifer Designation
Alluvium	Clay, silt, sand and gravel	Secondary A Aquifer
Head	Clay, silt, sand and gravel	Secondary Undifferentiated Aquifer
River Terrace Deposits	Sand and gravel	Secondary A Aquifer
Weald Clay	Mudstone	Unproductive Strata
Upper Tunbridge Wells Sand	Interbedded sandstone and siltstone	Secondary A Aquifer
Upper Tunbridge Wells Sand	Mudstone	Unproductive Strata

11.6.29 Secondary A aquifers are described by the Environment Agency as: '*Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers*' (What's In Your Backyard, Environment Agency, 2019)

11.6.30 Unproductive strata are described by the Environment Agency as: '*…rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow*'.. (What's In Your Backyard, Environment Agency, 2019)

11.6.31 The lateral extent of the aquifers is defined by their mapped outcrops. The alluvium and head aquifers are likely to be thin, no more than 2 metres at their thickest and become thinner towards the margins of the outcrop. The RTD are likely to be slightly thicker than the alluvium and head deposits, up to around 5 metres, but will similarly thin towards their margins. The more clay-rich alluvium may provide a degree of confinement where the RTD are present beneath, as well as containing perched water.

11.6.32 Groundwater is contained in the top of the Weald Clay Formation where this has been weathered to produce fractures. The Upper Tunbridge Wells Sand aquifer continues in subcrop beneath the Weald Clay Formation. The mudstone of the Weald Clay is generally considered to be an aquiclude (ie limiting the passage of groundwater) and is therefore likely to provide a high degree of confinement and limits the connectivity between groundwater in the upper aquifer of the superficial deposits and the lower aquifer of the Tunbridge Wells Sand. However, where the mudstone is thinnest, there may be some connection to the lower aquifer, if the mudstone is sufficiently weathered.

Groundwater Flow and Levels

11.6.33 The permeability of the alluvium and head is likely to be relatively low, dependent on the proportion of clay content; a higher clay content will result in lower permeability. The RTD have a relatively high permeability and storage. Normal values for such a formation are of the order of 100 m^2/day (Freeze and Cherry, 1979).

11.6.34 The Upper Tunbridge Wells Sand Formation has a moderate to low permeability (around 22 m^2/day), dependent on the proportion of siltstone (Jones *et al*, 2000). The layers of siltstone can also reduce the vertical connectivity within the formation, creating a stratified aquifer with perched groundwater. Faults within the Tunbridge Wells Sand formation can act as local conduits to groundwater flow, depending on fault throw and the juxtaposition of adjacent strata. However, they generally form barriers to regional flow, "compartmentalising" the aquifer (Jones *et al*, 2000).

11.6.35 Groundwater levels have been observed in historic GI at shallow depths within the superficial deposits, between around 0.8 and 3 mbgl (metres below ground level). Groundwater was also encountered within the weathered layers of the Weald Clay Formation, often at similar depths but in some locations at greater depths, up to 8 mbgl.

11.6.36 Groundwater monitoring is available from data loggers fitted to six boreholes associated with the existing runways for a period of over one year from March 2017, with an hourly data record. Depth to the water table was observed to vary through the year by over 1.2 metres in some locations, and as little as 0.7 metres in others. Only one of the boreholes shows a substantial seasonal fluctuation, with the variation in the others mostly relating to shorter term rainfall events, with very rapid increase in water levels and quick recessions. This is indicative of a small and low storage aquifer, possibly the weathered clay.

11.6.37 Where there is sufficient data, minimum recorded groundwater depths have been plotted and depth to groundwater contours generated. These are shown on Figure 11.6.8, although the paucity of data (in terms of its geographic spread) is such that these should be considered

indicative only. Groundwater elevation data (ie metres above ordnance datum (mAOD)) level data was rarely available and not therefore recorded.

11.6.38 Despite the lack of elevation data, based on the topography of the airfield the water table in the superficial deposits is relatively flat, with little or very sluggish groundwater flow. Further, a lot of the superficial deposits are found in isolated areas, without any connection to others. What groundwater flow there is will follow the local topography, and as such deflect towards the local or historic watercourses (see Table 11.6.2:). The nature of the weathering of the Weald Clay means that the groundwater may be found in relatively isolated pockets without complete hydraulic connectivity across the study area.

Recharge and Surface Water Interaction

11.6.39 Groundwater recharge primarily occurs from infiltrating rainfall through exposed soils. The large swathes of impermeable surfaces (runways, taxiways, aprons etc) across the airport will locally limit this recharge rainfall.

11.6.40 Based on the geological mapping, the surface watercourses are all likely to be lined by superficial deposits, primarily Alluvium. Perched groundwater contained within layers of the superficial deposits is likely to be in hydraulic continuity with the water level in the watercourse. When river levels are high these may locally recharge groundwater in the superficial deposits. Conversely, when river levels are low, there may be a small contribution to river baseflow from the superficial deposits. However, the clay layers within the Alluvium may restrict the connection to the water contained within the underlying RTD.

11.6.41 Due to the generally low permeability of the bedrock, there is not expected to be any significant connection with the surface water. Overall baseflow contribution to the watercourses may therefore be relatively low.

11.6.42 There may be some regional contribution to baseflow from the Upper Tunbridge Wells Sand Formation, but this is only partially exposed to the extreme south east of the study area and is not likely to be significant in this location. However, south and east of Crawley (in excess of 5 km to the south east of the airport boundary) the Upper Tunbridge Wells Sand Formation provides spring flow to the headwaters of the Gatwick and Burstow streams (Environment Agency, 2013).

11.6.43 Overall baseflow contribution to the watercourses (from both superficial deposits and underlying bedrock) in the vicinity of the airport may therefore be relatively low.

Groundwater Abstractions and Discharges to Groundwater

11.6.44 There are no SPZs for public water supplies within the groundwater study area, and no drinking water safeguard zones. One licenced groundwater abstraction for general use has been identified approximately 1 km south of the airport boundary. It is considered that this most likely abstracts from the Tunbridge Wells Sand Formation, but this is still subject to confirmation. It is not clear if this source is used for drinking water, but if so, it would, by default, have an associated SPZ1 of 50 metre radius. The Mole abstraction licensing strategy (Environment Agency, 2013) identifies that the Tunbridge Wells Sands currently receives little pressure from groundwater abstraction (ie it is little utilised). Crawley Borough Council has been contacted to establish the presence of any registered, unlicensed abstractions. At the time of writing, no response has been received.

Table 11.6.4: Licensed Groundwater Abstractions

Licence no.	NGR	Annual license Quantity	Daily Max	Source	Start (Expiry)
TH/039/0032/016	526681 138924	47,450 m^3	130 m^3	Groundwater (Borehole)	17/10/12 (31/03/2029)

11.6.45 No active licenced discharges to groundwater have been identified in the study area.

Groundwater Dependent Features

11.6.46 No potential GWDTEs have been identified within the study area. No potentially groundwater dependent lakes or ponds have been identified within the study area. There may be a baseflow component from groundwater to the surface watercourses, but it is considered likely to be secondary, and the watercourses are therefore not substantially groundwater dependent.

Conceptual Site Model and Groundwater Baseline Summary

11.6.47 Groundwater occurs in relatively thin, shallow superficial deposits of Alluvium and River Terrace Deposits (classified together as a Secondary A aquifer) that underlie the airport in a number of discontinuous bands. These groundwater bodies may be discrete and isolated, although there may be more continuous shallow groundwater bodies close to or adjacent to existing and/or historic watercourses. Groundwater occurs near the surface, typically between 1 - 3 mbgl, although because of the flat gradient, groundwater flow is sluggish, particularly in those areas dominated by low permeability Alluvium. The shallow groundwater is primarily recharged by rainfall. There may be some hydraulic continuity between shallow groundwater and the surface watercourses, and locally groundwater may be recharged by, or discharge to, these watercourses, albeit that this is likely to be at low rates. There are no sites of ecological importance supported by shallow groundwater and there are no consented discharges to groundwater. Despite its designation as a Secondary A aquifer, due to its limited depth, extent and connectivity as well as expected low permeability and potential for poor water quality, this shallow upper alluvium aquifer overall has a low importance and the River Terrace Deposits a medium importance.

11.6.48 Beneath the superficial deposits lies the Weald Clay Formation, primarily comprising mudstones. This is a thick sequence of bedrock strata, classified as an unproductive aquifer. Although there may be groundwater in weathered zones near the surface, it generally acts as an aquiclude thereby largely precluding the passage of groundwater. This prevents any downward migration of groundwater from the overlying upper, shallow aquifer, although there may be some very limited downward connectivity where the mudstone this and is extensively weathered. Groundwater within the Weald Formation strata is of negligible importance.

11.6.49 Also classified as a secondary A aquifer, the Upper Tunbridge Wells Sand Formation lies, mostly at depth, beneath the Weald Clay. There is some sub-crop of this strata to the extreme south east of the site, although it is largely isolated from the surface by the mudstone of the overlying Weald Clay and there is unlikely to be significant connectivity with the surface. There is one licensed abstraction assumed to be from the lower aquifer, about 1 km south of the airport perimeter. Although with a similar classification to the upper aquifer, this lower aquifer has a greater regional importance as an aquifer, and overall is of medium importance by reference to its aquifer designation and its local industrial/general use.

11.6.50 The sensitivity of groundwater aquifers is presented in Table 11.6.5.

Table 11.6.5: Sensitivity of Aquifers

Aquifer Unit	Importance/Sensitivity
Alluvium	Low
Head	Low
River Terrace Deposits	Medium
Weald Clay	Negligible
Upper Tunbridge Wells Sand (sandstone and siltstone)	Medium
Upper Tunbridge Wells Sand (mudstone)	Negligible

Flood Risk

11.6.51 The Project FRA (included here as Appendix 11.9.1) provides a preliminary assessment of all potential sources of flood risk, including fluvial, surface water, groundwater, sewer flooding and flooding from reservoirs, that would be updated to inform the ES. It addresses the key requirements of the Airports NPS and NPPF. Key findings regarding baseline flood risk conditions are summarised below.

Fluvial Flood Risk

11.6.52 Gatwick Airport is located in the Thames River Basin District and within the Upper Mole catchment. The River Mole flows through the airport, passing under the main and existing northern runways in culvert. Tributaries of the River Mole, including the Crawter's Brook, the Gatwick Stream and Westfield Stream all run through or adjacent to the Project site. Therefore, fluvial flood risk is the primary risk of flooding to the Project. The Environment Agency Flood Zones classification is used as the basis on which the Sequential Test is applied. It identifies the probability of flood risk in each Flood Zone. Flood Zones 1, 2 and 3a are defined by the Environment Agency, ignoring the presence of flood defences and without taking account of the predicted impact of climate change to the future probability of flooding. Flood Zone 3b should be defined by local planning authorities in agreement with the Environment Agency, taking into account the presence of flood defences.

11.6.53 Flood Zones 2 and 3 are identified in Figure 11.6.2. There are areas of Flood Zone 3 (areas at risk of flooding in a 1 per cent (1 in 100) AEP event) and Flood Zone 2 (area at risk of flooding in between a 1 per cent and 0.1 per cent (1 in 100 to 1 in 1000) AEP event) within the Project site. These are associated with the River Mole, Westfield Stream, Man's Brook and Crawter's Brook on the western and southern sides of the airport and with the Gatwick Stream on the eastern side. Beyond the Project site boundary, the Flood Zones are quite extensive and include a number of potential receptors for the Project, including residential areas and transport infrastructure that serves both Gatwick and the wider region.

11.6.54 There are areas of the airport at risk of fluvial flooding in the existing scenario from a 1 per cent (1 in 100) AEP event. Should such predicted flooding occur it would be managed to ensure the safety of passengers and staff by the Gatwick Airport Flood Threat Plan.

Upper Mole Hydraulic Model

11.6.55 The Upper Mole Hydraulic Model was updated by GAL in partnership with the Environment Agency. The objective was to improve the understanding of flood risk in the area, particularly to Gatwick Airport. The model was completed in 2018 and further updated in 2021 to mirror small modifications made by the Environment Agency to flow distribution and structural elements in the model upstream of the airport in Crawley. It is understood that the Environment Agency used this version of the model to update their published flood zones in February 2021. Further information is included in the FRA (Appendix 11.9.1).

11.6.56 Based on the model results flooding occurs within the Project site boundary for the 1 per cent (1 in 100) AEP event. The flooding extents for the 1 per cent (1 in 100) AEP event based on the Upper Mole Hydraulic model have been compared to the published Flood Zone 3 in Figure 11.6.3. Similar to the published Flood Zones, flooding is primarily associated with the River Mole and Crawter's Brook on the western and southern sides of the airport, and with the Gatwick Stream on the eastern side, around the South Terminal building. However, the actual flooding extents are different from published Flood Zones. The differences between the two models and extents are discussed in more detail in the FRA (Appendix 11.9.1). These variances have been raised with the Environment Agency. The Gatwick upper mole model has been adopted for this PEIR and the future ES.

11.6.57 The information included in the Project FRA and summarised above provides the basis to apply the Sequential and, where necessary, Exception Test for the Project (refer to Appendix 11.9.1).

Surface Water Flood Risk

11.6.58 The assessment of existing surface water flood risk to the Project site has been based on the Environment Agency Risk of Flooding from Surface Water mapping (RoFSW) as well as surface water modelling produced specifically by GAL.

11.6.59 The Environment Agency RoFSW mapping was used to make an overarching assessment of the existing surface water flood risk to the Project. It was used to determine overall patterns of surface water flooding and therefore, to steer the assessment of risks, impacts and mitigation measures that follow.

11.6.60 According to the RoFSW extents identified in Figure 11.6.4, surface water flooding occurs in several areas of the airport. Areas at high risk (greater than 3.3 per cent (1 in 30) AEP of flooding) are predominately associated with areas around existing watercourses or drainage features, although there are isolated pockets of high risk likely to be the result of rainfall filling local depressions rather than overland flow paths. Areas at medium risk (between 3.33 per cent and 1 per cent (1 in 30 and 1 in 100) AEP of flooding) are generally small and adjacent to the areas at high risk. A large area at medium risk is located near the River Mole and south of the existing main runway. There are larger areas predicted to be at low risk (between 1 per cent and 0.1 per cent (1 in 100 and 1 in 1000) AEP of flooding) within the airport, particularly to the south of the main runway and in proximity to existing terminal buildings.

11.6.61 The surface water model currently being developed by GAL has also been used to provide an understanding of the existing level of surface water flood risk from the Project. The assessment of modelling results has been included in the Project FRA (Appendix 11.9.1). Overall, it is considered that the Environment Agency RoFSW mapping provides an informative assessment

of existing surface water flood extents, while the GAL surface water model provides an understanding of the current runoff volume and rates, as well as an indication of how climate change would affect surface water flooding.

Groundwater Flood Risk

11.6.62 Groundwater is present in the superficial deposits, particularly the RTD, beneath the study area. This may occur in relatively small, discrete and discontinuous bodies, or, particularly adjacent to current and historic watercourses, may form more continuous groundwater bodies. Further information on the geological strata underlying the site is presented in Chapter 10: Geology and Ground Conditions.

11.6.63 Groundwater levels respond to direct recharge from rainfall but also, adjacent to water bodies, may respond to changes in river and stream levels. The rate of this response and the “outward” propagation of these levels from surface waters, may vary considerably across the site, depending upon the transmissivity and storage properties of the aquifer.

11.6.64 There are relatively sparse data for groundwater levels, but where these are available, they suggest groundwater levels are close to the surface (and may be less than 1 metre depth). Annual groundwater level fluctuation may be of the order 0.5 – 1.5 metres, but this is based on a very limited data set, mostly away from the influence of surface watercourses.

11.6.65 British Geological Survey (BGS) mapping identifies that there is susceptibility to groundwater flooding throughout areas of the site underlain by superficial deposits (ie superficial deposits flooding), with a moderate level of confidence. Areas susceptible to groundwater flooding are shown in Figure 11.6.5.

11.6.66 There is also identified susceptibility to groundwater flooding from the Tunbridge Wells Sand (clearwater flooding), but with a low level of confidence.

11.6.67 Based on the Crawley Borough Council SFRA there have been only two occurrences of groundwater flooding recorded in the Crawley area. These are not located near the airport. The SFRA identifies groundwater flood risk as being low for the Crawley Borough Council area as a whole and sets out that there is no conclusive evidence of elevated susceptibility to groundwater flooding within the borough.

Flood Risk from Reservoir Failure

11.6.68 Environment Agency Risk of Flooding from Reservoirs Maximum Outline data show that much of the western side of the airport would be at risk of flooding in the event of failure of the Ifield Mill Pond, while the eastern side, including sections of both terminal buildings, would be at risk from a failure of the long term storage lagoons adjacent to Crawley Sewage Treatment Works. Gatwick operates the two storage lagoons that receive contaminated runoff. The consequences of a potential failure from these structures has been mapped by GAL. In the event of a failure, flows would flood northwards, constrained from flowing westwards towards the airport by the London to Brighton railway. As large reservoirs, these structures are maintained and operated in accordance with the Reservoirs Act (1975) and therefore the risk of failure is considered very low due to their monitoring and inspection regime. The flood extent mapping does differ slightly between the two sources, which is considered to be due to differences in the level of detail included in the two models. However in general terms the models’ prediction of risk is broadly similar The reservoir flood risk flood extents are illustrated in Figure 11.6.6.

Sewer/Water Supply Flood Risk

11.6.69 Gatwick has a complex water distribution and sewerage network that should be considered as a potential source of flood risk. The failure of sewer or water supply infrastructure within or upstream of the Project site could result in flooding, although the risk of this is likely to be low given the maintenance and monitoring activities undertaken by Gatwick to avoid this.

11.6.70 At the time of writing, it was reported by GAL personnel that part of the Thames Water network, located in Horley, periodically reaches its capacity, causing flows to back up to the airport, as was observed during the June 2019 flow survey. This is not thought to pose a risk of flooding to the airport as flooding from the Thames Water network (beyond the airport) would occur first due to the topography, and this would limit the potential for surcharging within the network at the airport upstream. However, it could have an operational impact on the GAL sewers as the surcharging would reduce velocities in the pipes and sediment deposition is more likely to occur although this should be dealt with under the normal maintenance of the network.

11.6.71 The Crawley Borough Council SFRA (Crawley Borough Council, 2020) does not include a specific section on recorded sewer flooding events. However, given the reported capacity issues on the Thames Water network despite the lack of evidence of any historical flooding to the airfield as a result of these, there is considered to be a medium risk of sewer flooding at the airport.

Wastewater

11.6.72 The airport foul wastewater network comprises two discrete systems: one serving the North Terminal and discharging to Thames Water's Crawley sewage treatment works, and a second network serving the South Terminal and a hotel development on the North Terminal site discharging to Thames Water's Horley sewage treatment works approximately 6 km to the north of the airport via the trunk sewerage system.

11.6.73 The North Terminal system is characterised by a combination of gravity networks discharging to pumping stations. The main terminal area is served by Pumping Station 8 (PS8), which in turn receives flows from two pumping stations draining the old Premier Inn site and part of the southern quadrant of the terminal building respectively. PS8 discharges flows to the west into a gravity sewer which also serves the fuel farm and the sanitation block (where waste from aircraft is discharged), plus other ancillary buildings: this gravity sewer routes south towards the cargo terminal and discharges into Pumping Station 7 (PS7). The west side of the cargo terminal and the Boeing hangar are served by Pumping Station 6 (PS6), which discharges into the PS7 gravity system. PS7 is a terminal pumping station which discharges flows directly to the Thames Water trunk sewer on London Road on the south boundary of the airport conveying flows to Crawley STW approximately 1 km to the east.

11.6.74 The central parts of the airport comprising Pier 6, the fire station and control tower areas are served by Pumping Station 2 (PS2) with the Pier 6 flows discharging via Pumping Station 44 (PS44) at the pier. PS2 pumps flows forward to a gravity network discharging to Pumping Station 3 (PS3). This system also receives flows from the Virgin hangar, the Central Area Recycling Enclosure (CARE) facility, old control tower/Estates Utilities and Environment (EUE) facilities (via Pumping Stations 4 and 5) and the fire training ground via Pumping Station 45 (PS45). All flows from PS3 are injected into one of the twin pumping mains from PS7 so also discharge to the trunk sewer on London Road.

11.6.75 The South Terminal system on the west side of the railway is a predominantly gravity network although there are two small pumping stations serving Pier 2 and a larger facility Pumping Station 40 (PS40) serving part of the International Departure Lounge, which also receives the pumped flows from Pier 2. Gravity flows from the main terminal building, offices and service facilities discharge into a gravity sewer running north along Perimeter Road East to which PS40 discharges. The system on the east side of the railway is served by two gravity networks discharging to Pumping Station 19 (PS19 serving the car hire and car parking facilities) or Pumping Station 23 (PS23 serving the hotel, office and fast food facilities). These both pump across the railway using pipes fixed to bridges to discharge into the East Perimeter Road gravity sewer. North of the terminal building, this gravity sewer receives flows from Pier 3, the police station and the new Premier Inn before routing north across the A23 dual carriageway to discharge to Thames Water's Horley STW sewer network. The current configuration of the wastewater system is shown on Figure 11.6.9.

11.6.76 In 2019 GAL commissioned a study to model the foul water system, calibrate it and use it as a tool for assessing the current performance (Jacobs, 2019). The computer model was based on the records held by GAL which are largely the result of a comprehensive survey of the network undertaken supplemented by drawings from recent works. The calibration was based on a short-term flow survey performed in February and March 2019 for which flow and depth monitors captured the performance of the network at ten strategic locations: the survey was fortunate to record the end of a particularly dry period and a severe storm, so the operation of the network in fairly extreme conditions was observed. Although the network is nominally for foul discharges only, the observed flows confirm that there were small pockets of the estate that discharged storm flows.

11.6.77 The model was used to evaluate the performance of the foul sewerage system against the busiest day of 2018 for passenger numbers. This evaluation was conducted for both dry weather and wet weather conditions equivalent to a 3.3 per cent (1 in 30) AEP storm (a typical return period for testing flood risk from sewerage systems). The assessment of performance found that the network was adequate for the foul flows discharged in dry weather, but in wet weather PS7 had long running times during peak periods indicating stress on the system and the upstream network was at risk of flooding in extreme storm events. The report recommended replacing the existing pumps with models of increased capacity. In addition, the flow survey observed a possible constraint in the capacity of the Thames Water sewerage network discharging to Horley sewage treatment works downstream of the airport connection.

11.6.78 Since the PS7 pump upgrade is likely to be implemented in the short term, it has been incorporated in the current baseline model. Also, included this model is an upgrade to PS40 and associated pumping main which GAL is implementing to address problems with low velocities in the existing main.

Water Supply

11.6.79 Potable water is supplied to Gatwick via a single interconnected network, supplied via a 300 mm main. This supply includes fire flow. There are two additional potential supply points to the internal Gatwick Network, but these are normally closed.

11.6.80 As previously described baseline consumption data was taken from the 'London Gatwick – Water Masterplan 2020 & 2028 Forecast – Full backing report, 2018' report (Gatwick Airport, 2018). This report details a previous study into the water consumption at the site and forecasts demand

through to 2028 and has been included as an annex in Appendix 11.9.4 Water Supply. This report assumes that with no additional development consumption will increase to 749 Megalitres per year. This assumes no new water efficiency measures will be implemented.

Summary

11.6.81 Table 11.6.6 summarises the sensitivity of the identified receptors.

Table 11.6.6: Summary of Receptor Sensitivity

Receptor	Sensitivity
Surface Water	
River Mole	High
Tilgate Brook	High
Gatwick Stream	High
Water Infrastructure	Medium
Crawter's Brook	High
Burstow Stream	Medium
Burstow Stream Tributary	Low
Surface Water (airfield) ponds	High
Groundwater	
Secondary A superficial aquifer (alluvium)	Low
Secondary A superficial aquifer (RTD)	Medium
Secondary A Upper Tunbridge Wells Sand aquifer	Medium - High (latter based on Water Environment Regulations good status)
Flood Risk	
Residential properties	High
Industrial properties	Medium
Transport infrastructure	Very High
Airport Infrastructure	Very High
Airfield grassed areas	Low
Water Infrastructure – Wastewater	
Gatwick wastewater network	Medium
Water Infrastructure – Water Supply	
Gatwick potable water supply network	Low

Future Baseline Conditions

11.6.82 The assessment of likely environmental effects needs to consider any potential changes in the baseline that would alter the conclusions of the assessment. The primary source of future change with respect to the water environment baseline is considered to be climate change. A number of developments (see Chapter 4: Existing Site and Operation for a full description) have been

included in the future baseline that are consented and would progress in the absence of the Project. They are summarised below with a description of their potential influence on the future baseline:

- Western Pier 6 extension – limited change to the water environment (undertaken on existing impermeable areas).
- Runway resurfacing – limited change to the water environment.
- Additional car parking – potential reduction in peak runoff due to local planning requirements for betterment.
- Local widening of North and South roundabout junctions – potential changes to impermeable area.
- Increased hotel capacity – increased water demand and wastewater flows.
- Potential efficiency savings in water consumption in line with Decade of Change (GAL, 2021).

11.6.83 Commentary on Wastewater infrastructure in the text relate to Gatwick's private wastewater network. The Thames Water public sewerage network to which the airport discharges may undergo some changes in response to the increase in flows subject to the outcome of the forthcoming Thames Water Development Impact Assessment (see paragraph 11.9.2).

Initial Construction Phase: 2024-2029

Surface Water, Groundwater, Flood Risk and Water Infrastructure (Wastewater and Water Supply)

11.6.84 For flood risk and surface water drainage, the main source of future change to the baseline conditions is climate change. For the initial construction phase, and as a conservative approach (see Table 11.6.8), a 25 per cent allowance on peak river flows has been applied to consider the impact of climate change on fluvial flood risk.

11.6.85 For geomorphology, evolution due to natural adjustment of the watercourses is expected. The River Mole and Gatwick Stream are currently exhibiting some evidence of channel adjustment. These channels have been assessed as having a low to moderate energy, with limited ability to actively move the course of the planform. It is anticipated that if left undisturbed, the watercourses would continue to adjust slowly laterally and potentially through incision within the defined wider corridor. The remaining watercourses in the study area exhibited less evidence of adjustment, with lower energies, and are considered unlikely to adjust significantly. No change to the baseline is therefore considered for the initial construction phase.

11.6.86 The Water Environment Regulations future baseline will be affected by climate change and the impacts caused to habitat because of water levels, higher probability of severe storms, and potential changes in species preference. These changes are difficult to predict and potentially extraneous to the changes in the water bodies as a result of construction and operation. Overall, there will be no significant effect as the water bodies respond to changes and attempt to reach a new equilibrium. However, notwithstanding this, within the context of the timeframe for the initial construction phase (2024-29), no climate change impacts are identified, and therefore no changes to the baseline are expected.

11.6.87 The increase in impermeable area associated with consented developments are very minor. Discharge is understood to be to surface water features and not to ground. As such for groundwater, no significant changes to the current baseline are expected.

11.6.88 For water supply, based on the programme of proposed works, the increase in water consumption has been calculated and combined with the updated forecast to give total water demand. Water demand for construction activities has also been estimated and added to get a net change in water demand. Based on the programme of works, no works undertaken will directly impact on water demand, and therefore the baseline remains unchanged.

11.6.89 There are two consented projects that are expected to increase hotel capacity by an additional 250 rooms before the project commences. These would have a very slight increase on wastewater loading and water supply but that increase is not anticipated to be significant.

Water Quality

11.6.90 Winter peak day ATMs will continue to increase and the amount of aircraft de-icer used will increase, assuming environmental weather conditions are the same as the baseline year (the cold winter of 2017/18). However, the impact of climate change and weather variability on de-icer use and discharges to the environment are challenging to predict. The latest projections of future climate change (UKCP18[3]) indicate that winters will become wetter and warmer on average which will reduce the amount of both pavement and de-icer applied. However, whilst winters are anticipated to become warmer on average, cold weather spells will still occur. The total amount of winter rainfall is expected to increase, and winter storminess might also increase.

11.6.91 As the impact of de-icer on the environment from Pond D is a complex relationship between de-icer application during cold weather and the impact of rainfall washing off, diluting and transporting the de-icer, a detailed assessment of the future baseline will only be possible when the new pollution control model is fully verified for use, which will be used to inform the ES in 2021.

11.6.92 Anecdotally, there is little available capacity for future development within the existing treatment systems. Therefore, the future baseline may need to include additional infrastructure or operational changes to mitigate the impact of additional ATMs and/or climate change. These mitigations cannot be planned until the pollution control model is validated, but the types of mitigations required would be similar to the type of mitigation required for the Project: Additional retention or additional treatment at a new car park Y facility and/or extension of Dog Kennel Pond.

11.6.93 Therefore, for the purposes of this assessment, the assessment of impact against baseline uses the worst-case scenario of assuming winter 2017/18 weather conditions, with de-icer load predictions based on peak winter ATMs in 2038.

11.6.94 Pond A is used to retain de-icer contaminated runoff after a rainfall event and will be reduced in capacity during construction. When Pond A reaches capacity, it discharges to the River Mole. To mitigate any potential impact of the reduced volume of storage available, a permanent overpumping facility will be installed to increase the rate at which this pond is emptied into the much larger Pond M. The rate of overpumping has not yet been determined but the detailed

[3] https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp-headline-findings-v2.pdf

water quality model will be used to ensure that there is no increase in discharge from the pond into the River Mole. The Project is also increasing the amount of attenuation storage in the Pond M catchment to ensure that the rate of discharge into Pond M does not increase. Further storage would also be provided by upsizing Dog Kennel Pond to mitigate the loss of storage at A Pond.

First Full Year of Opening: 2029

Surface Water, Groundwater and Water Infrastructure (Wastewater and Water Supply)

11.6.95 It is anticipated that airport growth and any effects from climate change would not have a significant effect on surface water drainage, geomorphology, the Water Environment Regulations assessment, groundwater, and water infrastructure, when compared to the baseline assessment, for the same reasons outlined above for the initial construction phase (2024-29). Therefore, changes to the baseline are not expected for the first year of opening (2029) for any of these aspects.

Flood Risk

11.6.96 For the first full year of opening, and as a conservative approach (see Table 11.6.8), a 25 per cent allowance on peak flows has been applied to consider the impact of climate change on fluvial flood risk.

Water Quality

11.6.97 Winter peak day aircraft movements will continue to increase and the amount of aircraft de-icer used will also increase, assuming environmental weather conditions are the same as the baseline year (the cold winter of 2017/18). As stated in paragraph 11.4.28 for the purposes of the PEIR, the assessment of impact against baseline adopts the worst case scenario of assuming winter 2017/18 weather conditions, with de-icer load predictions based on peak winter ATMs in 2029.

Interim Assessment Year: 2032

Surface Water, Groundwater and Water Infrastructure (Wastewater and Water Supply)

11.6.98 It is anticipated that airport growth and any effects from climate change would not have a significant effect on surface water drainage, geomorphology, the Water Environment Regulations assessment, groundwater and wastewater, when compared to the baseline assessment, for the same reasons outlined above for the initial construction phase (2024-29) and the opening year (2029). Therefore, changes to the baseline are not expected in 2032 for any of these aspects.

Water Quality

11.6.99 Winter peak day ATMs will continue to increase and the amount of aircraft de-icer used will increase, assuming environmental weather conditions are the same as the baseline year (the cold winter of 2017/18). As stated in paragraph 11.4.28 for the purposes of the PEIR, the assessment of impact against baseline uses the worst case scenario of assuming winter 2017/18 weather conditions, with de-icer load predictions based on peak winter ATMs in 2038.

Flood Risk

11.6.100 For the interim assessment year, and as a conservative approach (see Table 11.6.8), a 25 per cent allowance on peak flows has been applied to consider the impact of climate change on fluvial flood risk.

Water Supply

11.6.101 Based on the information supplied by GAL, improvements to the North and South Terminals are due to be completed by 2030, and hotel facilities will be completed by 2032. This will allow for projected increased in staff numbers and passenger numbers, it is estimated that in the worst-case if these facilities were full to capacity, this would generate an increase in demand of 280 Megalitres per year. In addition to the updated forecasted baseline consumption in 2038 of 749 Megalitres per year, and estimated consumption due to construction activities of 3 Megalitres per year, this gives a total demand for this period of 1,032 Megalitres per year. This calculation does not include for any water efficiencies or water recycling that would reduce consumption per passenger.

Design Year: 2038

Geomorphology

11.6.102 For geomorphology, evolution of the watercourses is expected due to the effects of climate change, natural channel adjustment, and meeting policy objectives. Over a medium to long-term time period, climate change could potentially alter the hydrological regime of the watercourses. Increased frequency/severity of droughts and floods could potentially lead to the watercourses adjusting to different patterns of erosion and deposition. However, it is likely that the adjustment would remain localised and of relatively low magnitude given the channel types. Natural channel adjustment will continue to occur on all watercourses. Left undisturbed, the watercourses would continue to adjust slowly laterally and potentially through incision within the defined wider corridor.

Water Environment Regulations

11.6.103 The Thames RBMP provides details of the anticipated ecological status (which is partly dependent on stream morphology) for the Water Environment Regulations water bodies within the study area by 2027 (Defra, 2015). The Thames RBMP outlines mitigation measures in the Mole catchment, these are listed in full in Appendix 11.9.2 Water Environment Regulations Assessment. Of note are the following which could lead to improvement in individual quality elements: tackling non-native species, removal of fish barriers, and restoration of more natural morphology where man-made modifications exist.

Water Quality

11.6.104 Winter peak day ATMs will continue to increase and the amount of aircraft de-icer used will increase, assuming environmental weather conditions are the same as the baseline year (the cold winter of 2017/18). As stated in paragraph 11.4.28 for the purposes of the PEIR, the assessment of impact against baseline uses the worst case scenario of assuming winter 2017/18 weather conditions, with de-icer load predictions based on peak winter ATMs in 2038. Therefore, this is the maximum design scenario assessed.

Groundwater

11.6.105 For groundwater, climate change predictions suggest that changes in rainfall patterns are likely to lead to overall reductions in groundwater recharge. For example, it has been suggested that there may be a 40 per cent reduction in potential groundwater recharge by the end of the 21st century (Airports Commission, 2014). However, by the design year, there may only be a limited quantum of change in recharge compared to the current baseline groundwater conditions in the vicinity of

the airport. Any commensurate reduction in groundwater levels, should they occur, is likely to lessen the potential impact from the airport development.

Flood Risk and Surface Water Drainage

11.6.106 The Environment Agency's climate change allowances last updated in February 2021 (Environment Agency, 2016a) are the best national representation (from a guidance perspective) of how climate change is likely to affect flood risk for peak river flow and peak rainfall intensity available at the time of writing this chapter. The allowances for peak river flow were updated and republished by the Environment Agency in July 2021 to reflect UKCP18 data. This assessment continues to adopt the previous set of allowances based on the UKCP09, and the 2021 update will be used to inform the ES. The new set of allowances for peak river flow have reduced for the River Mole catchment, therefore the current assessment is considered to be conservative. Allowances for rainfall intensity are yet to be updated and republished. The uplift factor to be applied is determined by the location, design life and vulnerability classification of the proposed development. The uplift factors to be applied in small urban catchments are indicated in Table 11.6.7.

Table 11.6.7: Total potential change of peak rainfall intensity anticipated for 2010 to 2115

Applies to across all of England	Total potential change anticipated for 2015 to 2039	Total potential change anticipated for 2040 to 2069	Total potential change anticipated for 2070 to 2115
Upper End	10%	20%	40%
Central	5%	10%	20%

11.6.107 When determining the potential impact of climate change on rainfall, the guidance states that both the 'Upper end' and 'Central' allowances as outlined in Table 11.6.8 should be considered, to understand the potential range of the impact and that discharge rates should be restricted to the 'Upper end' allowance.

11.6.108 In this case, the assessment is undertaken based on a 40-year lifetime for the Project (up to 2069). It is considered that a longer design life would not be realistic given it is likely there will be further significant changes to the Airport in that timescale. Gatwick Airport has changed considerably during the past 40 years and this rate of change is anticipated to continue. Assessment of climate change allowances over a longer design life is therefore considered disproportionate. An allowance of 35 per cent has therefore been applied to incorporate the predicted impact of climate change for the design event peak river flow (see Table 11.6.8). The highways improvements are considered to have a longer lifetime of 100 years given the nature of highways design and duration, therefore a climate change allowance of 70 per cent has been adopted for peak river flow for these elements to assess the impact from and to fluvial flood risk. The twin approach has been confirmed in discussions between GAL and the Environment Agency.

11.6.109 Therefore, the 10 per cent and 20 per cent climate change allowances should be applied for peak rainfall intensity. However, as a conservative approach, the 20 per cent value has been adopted as the main climate change allowance for the assessment. The 40 per cent has also been tested as an exceedance scenario, in order to test the impact of a larger potential impact of climate change.

11.6.110 The allowance to be made for the predicted impact of climate change on peak river flows is subject to the river basin district, in this case identified as Thames River Basin. Table 11.6.8 indicates the recommended uplift factors for the Thames River Basin, in line with Environment Agency climate change allowances.

Table 11.6.8: Recommended climate change allowance for peak river flows

Applies to Thames River Basin	Total potential change anticipated for 2015 to 2039	Total potential change anticipated for 2040 to 2069	Total potential change anticipated for 2070 to 2115
Upper End	25%	35%	70%
Higher Central	15%	25%	35%
Central	10%	15%	25%

11.6.111 According to relevant guidance (Environment Agency, 2016), the Higher Central and Upper End allowances should be used for 'Essential Infrastructure' in Flood Zone 2. In this case, as a conservative approach, the assessment has been based on the 35 per cent climate change allowance, while the 70 per cent value has also been tested as an exceedance scenario.

11.6.112 It should be noted that the climate change guidance (Environment Agency, 2016a) is based on the UKCP09 climate projections. The Environment Agency published updated guidance for the consideration of future peak river slow in July 2021 to reflect UKCP18 data. This assessment adopts the previous set of guidance, however the 2021 guidance will be adopted for the ES. The new set of peak river flow allowances have reduced compared to those based on UKCP09 and therefore the current assessment is considered to be robust and conservative. The assessment of potential climate change impacts will be revisited for the ES, assuming that new guidance will be issued by the Environment Agency for climate change factors related to river flows and rainfall intensity, based on UKCP18 data.

Wastewater

11.6.113 No changes to the baseline are expected: the airport foul sewerage network itself is not expected to change. However, regional growth and climate change pressures on the downstream public wastewater collection and conveyance facilities may result in changes implemented by Thames Water. This will be considered by Thames Water in their Development Impact Assessment.

Water Supply

11.6.114 During the period to 2038, Pier 7 works will be completed, increasing water consumption by an additional 369 Megalitres per year. This increased total on-site consumption to a total demand for this period of 1,401 Megalitres per year. This calculation does not include for any water efficiencies or water recycling that would reduce consumption per passenger.

11.7 Key Project Parameters

11.7.1 The assessment has been based on the parameters identified within Chapter 5: Project Description.

11.7.2 Table 11.7.1 identifies the key parameters relevant to this assessment. Where options exist, the maximum design scenario selected is the one having the potential to result in the greatest effect

on an identified receptor or receptor group. Effects of greater adverse significance are not predicted to arise should any other option identified in Chapter 5: Project Description be taken forward in the final design of the Project. The selection of the preferred option for other Project elements (eg CARE and Inter Terminal Transit System (ITTS) are less significant for this assessment.

11.7.3 The following sections place a high-level overview of the proposed works in a water environment context.

Alterations to the Existing Northern Runway, Taxiways and Holding Areas

11.7.4 The existing northern runway would be adjusted to reposition the centreline 12 metres further north. There would be a number of associated works to taxiways that would require the construction of new areas of hardstanding. Redundant areas would be broken out and removed. This would result in an increase in impermeable area and consequently surface water runoff volume (including potentially polluted runoff). It would also encroach into the existing floodplain and disconnect areas that currently flood from the floodplain.

Pier and Stand Amendments

11.7.5 A new Pier 7 is proposed to the north west of Pier 6, adjacent to the existing cargo facility covering approximately 10.1 hectares. It is not anticipated this would have a significant impact on the water environment as it would be constructed on existing impermeable areas and would not therefore affect existing runoff and drainage patterns.

11.7.6 There would be a series of modifications to existing stand provision across the airfield that would have the potential to alter the distribution of runoff and the use of de-icer which could affect water quality if unmitigated. However all runoff would continue to drain to the existing airfield ponds.

Reconfiguration of Existing Airport Facilities

11.1.1 A number of existing facilities would require reconfiguration, relocation or additional facilities to be provided, to accommodate the proposed changes to the airport, including CARE, cargo, the fire training ground, hangers, noise mitigation (eg walls and bunding) and internal access routes and forecourts. These elements have the potential to redistribute runoff across the airfield however runoff would continue to drain to existing ponds. The noise mitigation measures could sever or remove existing floodplain.

Hotel and Commercial Facilities

11.7.7 An increase in passenger and aircraft operations would require additional office and hotel provision to meet the needs of airport companies and passengers. Provision of new office space could provide for up to three new office blocks, each office building having a footprint of approximately 1,024 m^2. Three new hotels are proposed as part of the Project. The office and hotel elements could affect water infrastructure requiring the provision of additional water supply and an increase in wastewater flows. These developments would be undertaken on existing impermeable areas and would therefore not affect flood risk and drainage.

Main Contractor Compound (MA1)

11.7.8 This would be a securely fenced compound in an area west of the perimeter road on an area of hardstanding currently occupied by car parking. This could increase runoff to the drainage system and increase the risk of pollution to the water environment.

Airfield Satellite Contractor Compound

11.7.9 This would be a securely fenced compound anticipated to be to the west of Taxiway Uniform and south of the Boeing hangar currently comprising a construction compound for the Boeing hangar, grassland, a reed bed and a hedgerow. Parts of this compound would be within the existing River Mole floodplain.

Surface Access Satellite Contractor Compound, South Terminal

11.7.10 This would be a securely fenced compound of approximately 2 hectares of greenfield land located to the north of the South Terminal roundabout and Airport Way. The compound could increase runoff compared to the baseline situation that would need to be managed to prevent an increase to flood risk. It could also introduce the risk of pollution to the receiving watercourse(s) or sewers.

Car Parking

11.7.11 New car parking would be required on site in order to meet additional demand generated by the proposed increase in passengers, and to replace existing parking spaces that would be lost due to development associated with the Project. New car parking would be provided at North Terminal Long Stay, Multi-storey car parks J, Y and H and Pentagon Field. Excavations for new car parks could affect groundwater resources. The new Pentagon field parking is on an area of existing farmland that could affect flood risk and water quality by increasing discharges of potentially polluted runoff to watercourses.

11.7.12 For the provision of Purple parking at Crawter's Field the grassland and woodland would be cleared and used for parking, increasing the impermeable area, potentially increasing runoff rates and consequently flood risk and the risk of pollution to watercourses.

Surface Access Improvements

11.7.13 In order to accommodate the proposed increase in passenger numbers and taking into account other known and planned developments in the area, improvements are likely to be required to the South Terminal, North Terminal and Longbridge roundabouts and to add capacity and will include increasing the number of lanes on the A23 and M23 spur plus grade separated junctions. This could be detrimental to the water environment by increasing flood risk due to encroachment into the floodplain and increased runoff, it could be potentially detrimental to water quality by increasing the discharge of pollutants to receiving watercourses and the modifications to the existing Brighton Road bridge over the River Mole could affect geomorphology. Piling activities during construction could affect groundwater resources.

11.7.14 Other surface access improvements: rail and Inter-Terminal Transit System (ITTS), are not anticipated to affect the water environment.

Wastewater Treatment Works

11.7.15 Construction of a new wastewater treatment works would ensure capacity is maintained to meet the requirements of future passenger numbers produced by the Project. Excavations for construction could impact upon groundwater resources.

CARE Facility (Options 1 and 2) Phase 1 and 2

11.7.16 There are two options for the location of the new CARE facility. Its construction would require the breakout and removal of existing car park hardstanding, removal of existing greenfield areas of trees and potentially hedgerows. This would result in an increase in impermeable area and consequently runoff to the drainage network. Below ground works could impact on groundwater. The option and therefore location selected would not significantly alter the nature of the development or its effects.

Noise Mitigation Feature

11.7.17 Reshaping and relocation of the existing noise bund would involve the clearance of the young woodland planting which currently covers the bund. A new mitigation feature would be constructed adjacent to Lowfield Heath Road. This could cause localised changes to surface water flows and fluvial flood extents.

Fire Training Ground

11.7.18 The fire training ground would be consolidated and re-provided immediately to the north of its current location. This could change runoff characterises of potentially polluted water.

North Terminal Extension and Forecourt

11.7.19 The main improvements to the North Terminal would include an extension of the departure lounge, an extension of the baggage hall and an extension of baggage reclaim. Small amounts of hard and soft landscaping would be removed within the forecourt area and re-provided. The increase in passenger numbers that this allows would increase water supply requirements and wastewater produced. It would also increase impermeable area and consequently runoff.

South Terminal Extension and Forecourt

11.7.20 Construction and operation of a terminal building extension, including a two-storey autonomous vehicle transition space to Pier 7. This would result in increased passenger numbers and consequently water supply requirements and wastewater produced. It would also increase impermeable area and consequently runoff.

Offices at South Terminal

11.7.21 Construction and operation of two office blocks in car park H east of South Terminal and the Hilton Hotel could increase water demand and wastewater flows.

Fluvial Mitigation Measures

11.7.22 A number of mitigation measures are embedded into the Project to meet national planning policy to ensure no increase in fluvial flood risk to other parties. Details of these measures are included in Table 11.8.1 and the FRA (Appendix 11.9.1), but include:

- Museum Field floodplain compensation area;
- realignment and naturalisation of the River Mole downstream (north) of the northern runway;
- car park X floodplain compensation area (FCA); and
- Gatwick Stream floodplain compensation area.

Table 11.7.1: Maximum Design Scenarios

Element	Potential Impact	Maximum Design Scenario	Justification
Initial Construction Phase: 2024-2029			
Groundwater	Dewatering (groundwater flow, levels, settlement). Diversion of groundwater flow. Groundwater flood risk to buried structures/ services.	Approximate depths of excavations: Museum Field flood compensation area: 3.5 metres, east of Museum Field flood compensation area: 1.8 metres, car park X flood compensation area: 2.5 metres, Gatwick Stream flood compensation area: 3 metres, car park Y (drainage retention tank) 6 metres, fire training ground: 5 metres, new pumping stations: 10 metres, CARE, motor transport and surface transport facilities: 5 metres. Below ground works or surface works may impact recharge/ groundwater quality.	This scenario would result in maximum impact on groundwater flow and levels. Flood risk, surface water and geomorphology elements unaffected.
Geomorphology	Damage to River Mole banks and watercourse due to construction activities associated with River Mole diversion.		Works being undertaken within existing River Mole corridor to complete diversion.
Water Quality	Impact of additional treated de-icer contaminated runoff on river quality in the River Mole.	Worst winter day ATMs, worst winter day pavement de-icing, A Pond reduced in size, but permanent overpumping station to D Pond installed. Dog Kennel Pond increased in size to offset reduction in Pond A.	This scenario would cause additional de-icer contaminated runoff to be discharged to the River Mole if mitigation was not provided.
Flood Risk	Increased flood risk due to loss of floodplain storage.	Proposed airfield satellite contractor compound, Juliet West Taxiway and End Around Taxiways	This scenario would reduce floodplain storage, if no mitigation was in place (medium-term

Element	Potential Impact	Maximum Design Scenario	Justification
		encroaching into floodplain (refer to Chapter 5: Project Description).	impact for construction compound and long-term impact for taxiways).
Wastewater	Flooding arising from increased flows in the wastewater network exceeding capacity, potentially disrupting airport operations, particularly in and around the terminal buildings.	Peak wastewater flow discharges from passengers, construction workers and other airport related flows on the busiest day of the assessment year which constitutes the highest combined impact of normal airport flows coincident with construction activities, where this coincides with a 3.3% (1 in 30) AEP storm event.	This scenario is a common standard for urban drainage systems.
Water Supply	Increase in demand from construction activities. This could impact the water source upstream.	The maximum design scenario considered is for construction activities occurring within the construction phase by year, in addition to the future baseline forecast passenger demand increase.	Based on Project peak construction water demand.
First Full Year of Opening: 2029			
Water Quality	Discharge of diluted untreated de-icer to the River Mole from Pond D upper.	Not greater than Design Year: 2038	The worst-case design scenario has been assessed as being design year 2038. Assuming the 2017/18 weather conditions, maximum pavement area and maximum ATMs, no operational improvements in de-icer application and no change to treatment infrastructure is the maximum design scenario. No interim design scenario could have a greater impact on the environment.
Wastewater	Flooding arising from increased flows in the wastewater network	The maximum design scenario considered is for peak wastewater discharges on the busiest day of	This scenario is a common standard for urban drainage systems.

Element	Potential Impact	Maximum Design Scenario	Justification
	exceeding capacity. Potentially disrupting airport operations, particularly in and around the terminal buildings.	the assessment year for which the peak day passenger numbers are expected by GAL to increase by approximately 6 per cent from the 2029 baseline, where this coincides with a 3.3 per cent (1 in 30) AEP storm event.	
Water Supply	Ongoing construction activities will have an impact on water supply due to the increase in demand.	The maximum design scenario considered is for construction activities occurring throughout the year, in addition to the Baseline demand.	This scenario would represent the maximum demand for water supply.
Interim Assessment Year: 2032			
Groundwater	Dewatering (groundwater flow, levels, settlement). Diversion of groundwater flow. Groundwater flood risk to buried structures/ services.	Depth of excavation: East of Museum Field flood compensation area: 1.8 metres	This scenario would result in maximum impact on groundwater levels and flow.
Water Quality	Impact of additional treated de-icer contaminated runoff on river quality in the River Mole.	Not greater than Design Year: 2038	Car Park Y design has been based on worst case design scenario for year 2038. The 2017/18 weather conditions, maximum pavement area and maximum ATMs, no operational improvements in de-icer application and no change to treatment infrastructure represents the maximum design scenario. No interim design scenario could have a greater impact on the environment. Timing of provision of Car Park Y will be determined by detailed modelling supporting the ES and will

Element	Potential Impact	Maximum Design Scenario	Justification
			be in advance of any potential impact.
Wastewater	Flooding arising from increased flows in the wastewater network exceeding capacity. Potentially disrupting airport operations, particularly in and around the terminal buildings.	The maximum design scenario considered is for peak foul flow discharges on the busiest day of the assessment year for which the peak day passenger numbers are expected by GAL to increase by approximately 19 per cent from the 2032 baseline, where this coincides with a 3.3 per cent (1 in 30) AEP storm event.	This scenario is a common standard for urban drainage systems.
Water Supply	The potential impact on the water supply system is an increase in demand from ongoing construction activities and from the extensions to the North and South Terminals.	The maximum design scenario considered is for construction activities occurring throughout the assessment year, in addition to the forecast existing passenger demand increase.	This scenario would represent the maximum demand for water supply.
Design Year: 2038			
Flood Risk, Surface Water Drainage, Geomorphology, Water Environment Regulations and Groundwater	The assessment assumes the completed Project is in place.		
Water Quality – Deicer	The assessment assumes the Project is in place. De-icer forecasts are based on ATM forecasts for 2038 and assumes the whole airside pavement is de-iced. The maximum design scenario assumes worst winter day.		
Wastewater	The potential impact on the foul sewerage system is flooding arising from increased flows in the network exceeding the available capacity. This could disrupt	The maximum design scenario considered is for peak foul flow discharges on the busiest day of the assessment year for which the peak day passenger numbers are expected by GAL to increase by approximately 21 per cent, where	This scenario is a common standard for urban drainage systems.

Element	Potential Impact	Maximum Design Scenario	Justification
	airport operations, particularly in and around the terminal buildings.	this coincides with a 3.3 per cent (1 in 30) AEP storm event.	
Water Supply	The potential impact on the water supply system is an increase in demand from the predicted additional throughput of 13 million passengers per annum.	The maximum design scenario considered is for peak demand taking account of additional passenger numbers from completed improvements to the terminal.	This scenario would represent the maximum demand for water supply, driven by the increase in passenger numbers.

11.8 Mitigation and Enhancement Measures Adopted as Part of the Project

11.8.1 A number of measures have been designed into the Project to reduce the potential for impacts on the water environment. These are listed in Table 11.8.1. Also, measures to mitigate construction effects are outlined in Section 11.8.3.

Table 11.8.1: Mitigation, Monitoring and Enhancement Measures

Measures Adopted as Part of the Project	Justification
Mitigation	
Provision of compensatory flood storage	Floodplain storage would be lost due to ground raising for Project elements within the floodplain. Provision has been made to introduce new flood compensation areas (FCAs) as close as possible to areas where floodplain storage would be lost. These include: Museum Field FCA connected to the River Mole via a spillway that also connects to a new east of Museum Field FCA (between the River Mole and Museum Field); a flood compensation area at the existing car park X; and a new flood compensation area to the east of Gatwick Stream. The FCAs would include measures to reduce their own impact: ▪ Fish refuges on floodplain. For example, low points within the FCA could be connected to the watercourse by swales to encourage any fish that move with rising flood water to return to the river as flood waters recede. ▪ Design flow control structure to reduce water levels behind the embankment slowly. (If the water level receded rapidly fish are more likely to be stranded.) ▪ Any low points within the flood storage area should be connected by swales to encourage any fish that move with rising flood water to return to the beck as flood waters recede. ▪ Loss of aquatic habitat for fish should be mitigated by in-channel habitat elsewhere.

Measures Adopted as Part of the Project	Justification
Reconfiguration of impacted surface water attenuation facility (Pond A)	The storage volume of Pond A would reduce due to the proposed Taxiway Juliet and this volume needs to be compensated for elsewhere to ensure no increase in flood risk. A new below ground attenuation feature will be created south of the current runway that will mitigate for the additional impermeable area created in the A Pond and M pond catchment. A new overpumping facility at A Pond will ensure that there is no additional discharge from A Pond to the River Mole. The capacity of Dog Kennel Pond may be increased to offset the loss of volume from Pond A.
Relocation and reconfiguration of impacted surface water attenuation facility (Pond A)	A large volume of the existing Pond A storage would be lost to the proposed Taxiway Juliet and this volume needs to be compensated for elsewhere to ensure no increase in flood risk. Pond A would be relocated directly to the north of its current position. The volume of the relocated Pond A would accommodate increased runoff due to increases in impermeable area due to the Project within the catchment it drains.
Realignment of the River Mole	The proposed relocation of Pond A north of its existing location, requires the realignment of the River Mole. This would include the general enhancement of the River Mole channel area to increase its capacity. The existing River Mole culvert and syphon outfall structures would be extended as part of this work.
New culvert design	New culverts are proposed on the Burstow tributary and the extension of the existing River Mole culvert. These would include geomorphological mitigation: ▪ Design new culverts to be as short as possible to avoid tunnelling effect and light-dark barrier at threshold. ▪ Design new culverts to have rough bed/baffles to maintain water depth at low flows to allow fish passage.
Provision for new airfield syphons	Where proposed taxiways would bisect parts of floodplain areas, areas of floodplain would be disconnected. Two syphon connections are proposed to retain floodplain connection on both sides of the taxiway.
Surface access improvements drainage strategy	The surface access improvements proposed as part of the Project would result in additional surface water runoff due to the introduction of new impermeable area. As part of these works, it is proposed that a drainage network would be installed, consisting of carrier drains, filter drains, ditches and attenuation ponds, along with flow control arrangements to limit discharges to watercourses. Therefore, surface water runoff would be restricted to pre-development values, and where possible, greenfield rates. This would ensure no increase in flood risk as a result of these works.
Additional de-icer retention at Pond A	Pond A would be relocated, and a new BOD discharge control monitoring system would be implemented to ensure that discharges of diluted de-icer runoff to the environment would only happen under extreme weather conditions and would occur less frequently than the baseline situation. Improved attenuation and discharge control provided by the relocation of Pond A would ensure that all de-icer contaminated runoff would be retained within Pond A

Measures Adopted as Part of the Project	Justification
	and then pumped forward through the pollution control system for management at Pond D (lower).
Additional de-icer retention and/or retention at car park Y	A new retention and/or treatment system is proposed to be provided at car park Y to mitigate for the additional de-icer load associated with the increase in pavement area and the increase in winter ATMs. At this stage in the modelling, it is not possible to determine the most environmentally and cost-effective balance of storage and treatment. Therefore, a modular below ground system has been planned that can provide either retention only, treatment only, or an optimized combination of both, and would be of sufficient size to fully mitigate the additional de-icer load. It is currently planned that a subsurface load balancing tank and aerated gravel bed filter would offset any increased load arriving at Pond D (lower). Should an aerated gravel bed system not achieve the load reduction required, then the treatment process could be intensified to higher rate treatment processes such as moving bed bioreactor, although such a treatment system would require appropriate nutrient feed and would require to be primed at the start of winter and rundown at the end of the season. In the unlikely event that detailed modelling to support the ES shows there is insufficient land availability at car park Y for a subsurface treatment system and a load balancing tank, increased capacity could be provided to treat deicer contaminated runoff in Pond M and further reduce the load upstream of car park Y, although this is not anticipated to be required. Current deicer recovery rates are low by international standards (due to the temperate nature of our climate, the cost of maintaining a recovery fleet for intermittent recovery, and the type of deicer used). No consideration has been given to the use of deicer recovery at deicing pads, although this will be examined alongside detailed modelling to support the ES. It is possible that a deicer recovery system could offset the need for additional treatment infrastructure, and this would be a more sustainable option in terms of raw resource and energy use. The configuration of the pollution control system with the Project is shown on Figure 11.8.1.
Wastewater System Capacity Upgrades	The potential impact on the foul sewerage system is flooding arising from increased flows in the network exceeding the available capacity. This could disrupt airport operations, particularly in and around the terminal buildings. Wastewater improvements to the foul sewerage system as part of the Project would include the following: construction of new pumping station 7a to replace existing facility PS7 to provide additional capacity; replacement of pumps and pumping main at pumping station PS06 to provide additional capacity; construction of a new pumping station on the east side of the Brighton-London mainline railway to convey all foul flows from this area to Crawley STW to relieve the gravity outfall pipe discharging to Thames Water's Horley STW sewer network. The configuration of the wastewater system with the Project is shown on Figure 11.8.2.

Measures Adopted as Part of the Project	Justification
	Similar upgrades would also be required for the alternative wastewater disposal option of providing a GAL owned and operated sewage treatment works adjacent to Crawley sewage treatment works should Thames Water be unable to accommodate the future foul flows.
Geomorphological mitigation for River Mole diversion valley	Realignment of the River Mole would include geomorphological mitigation in its design. Creation of a more natural planform and a two stage channel would improve flow regime (not only for the 1:100-year flow), channel diversity and floodplain coupling. The design would include varied cross sections to mimic natural processes, bed and bank forms, and would be of a suitable river type for the bed gradient of the realignment in order to maintain sediment transport capability. Suitable substrate would be added to the diversion channel following the works.
Geomorphological mitigation for flood compensation areas	Soft/bio engineering would be used in preference to concrete where natural banks require protection at the connecting spillways to the new flood compensation areas. The bank form would also be varied where they are being altered/lowered to ensure natural variance of flow in the channel. Ecological planting would take place on the newly created floodplain compensation areas. This would restore natural vegetation to the floodplain whilst protecting the banks from erosion.
Geomorphological mitigation for culvert extensions	Culvert extensions on the River Mole and Burstow Stream Tributary would be designed with a depressed invert and a natural bed gradient in order to maintain sediment transport capability. The culvert would also be designed with splayed wing walls to reduce the light and dark barrier. There would be inclusion of baffles or a low flow channel to retain sediment in the culvert and create suitable depth of flow under a range of conditions.
Monitoring	
Water quality monitoring	GAL would continue to monitor the quality of water discharges to ensure compliance with environmental permits post Project. Given the increased de-icer loading, additional water quality monitoring within Gatwick's system would be implemented as part of the overall water quality management system.

Measures Adopted as Part of the Project	Justification
Enhancement	
All Water Environment disciplines	At this stage, no specific enhancement measures have been developed as part of the Project. However, the realignment of the River Mole and other flood mitigation measures would provide general enhancement by decreasing off-site flooding. As the Project develops, further opportunities for enhancements will be explored.

11.8.2 In addition to the measures identified above, a number of further measures are proposed in order to manage potential impacts associated with construction activities. These will be implemented through the Code of Construction Practice (CoCP). An outline CoCP is provided in Appendix 5.3.1.

11.8.3 For a Project of this scale there are a large number of measures that would be implemented to mitigate effects during construction. These would include measures such as the following.

- Constructing adequate temporary Sustainable Drainage Systems (SuDS) or conventional drainage to contain surface water and silt during the construction period.
- Identifying the location of services before any work commences to avoid any damage during construction.
- Ensuring adequate dewatering takes place during excavation activities or construction of subsurface features and foundations, in line with any permitting requirements.
- Ensuring dewatering does not mobilise existing contamination or lead to settlement or other such effects.
- Ensuring piling works do not create preferential pathways for contamination through a piling risk assessment.
- Ensuring the drainage system has adequate capacity to store any additional surface water runoff or groundwater required to be pumped out of excavations.
- Implementation of water efficiency measures to minimise additional water use, such as pressure management, grey water recycling and rainwater harvesting, and water efficient controllers on tap and urinals.
- Where river realignment is proposed, construction activities should be planned to ensure no increase in fluvial flood risk, with temporary mitigation provided if required.
- Where the construction of Project elements within the floodplain is proposed, phasing would be developed to ensure adequate mitigation is provided prior to the loss of any floodplain as a result of construction activities, where reasonably practicable. Where this is not practical, ensure temporary floodplain compensation is provided if the construction activities would increase flood risk elsewhere.
- Constructing the River Mole diversion offline and leave to vegetate over before flow is initiated down the channel. This would reduce the release of fine sediment and the likelihood of any unexpected large-scale channel change.
- Preparing an incident response plan prior to construction. This would be present on site throughout construction, informing all site workers of required actions in the event of a flooding incident.
- Using site materials free of contamination, avoiding any potential contamination of local surface water flow paths.

- Ensuring that wet cement does not come in to contact with surface water or groundwater.

11.9 Assessment of Effects

11.9.1 The assessment of effects has been undertaken for each element of the Project. The assessment takes a reasonable worst-case approach considering the completion of construction in 2038, in addition to effects during construction and an interim assessment year.

11.9.2 The capacity of the public sewerage network to which the private Gatwick wastewater system discharges and the downstream sewage treatment works is the responsibility of Thames Water under the terms of its license as the statutory authority. Discussions with Thames Water are ongoing to agree the quantity and distribution of discharges from the airport in the future. An assessment will be required to determine the impact on both the Thames Water sewerage network and treatment capacity. Thames Water will undertake a Development Impact Assessment to confirm whether there will be any impact from the Project. If capacity issues are identified, Thames Water will be responsible for reinforcing their network to support development and they will recoup their costs through infrastructure charges to GAL. The anticipated effect on the Thames Water wastewater infrastructure resulting from the Project is based on the projected increase in foul flows pending completion of any mitigation works. This, and the mitigation works required by Thames Water – if any – are to be confirmed during the EIA process and will be reported in the ES. In the event that there is not sufficient capacity or that improvements cannot be made to provide this capacity, an expansion to the existing Crawley Sewage Treatment Works may be required. This would be undertaken separately by Thames Water. However, an area of land has been identified to allow the expansion on land owned by GAL, in case this is required.

Initial Construction Phase: 2024-2029

11.9.3 This section sets out effects that could occur during the Project initial construction phase between 2024 and 2029.

11.9.4 For the purpose of this assessment, the classification of impact magnitude also takes into account impact duration. For the construction phase period, most impacts are considered to have a ‘medium term’ duration, defined as a period of more than one year and up to five years.

11.9.5 Mitigation would be implemented through the CoCP (an outline CoCP is provided in Appendix 5.3.1), and these measures are discussed in Section 11.8. For the construction phase, the magnitude of each impact has been determined based on professional judgement and taking account of the proposed mitigation measures, including the CoCP.

Surface Water

11.9.6 During the initial construction phase, works would generally be contained within the airfield with some additional activities taking place beyond the current operational airport boundary. The latter includes proposed surface parking at Pentagon Field (previously greenfield), construction of flood mitigation areas and the establishment of construction compounds. In addition, the works to the South Terminal roundabout would begin towards the end of this initial construction phase. Within this phase the following flood mitigation areas would be constructed:

- Modification of Pond A;
- Modifications to Dog Kennel Pond;
- River Mole channel diversion;

- Museum Field flood compensation area;
- East of Museum Field flood compensation area;
- Underground surface water storage at car park Y; and
- Car park X flood compensation area.

11.9.7 Construction of additional surface water storage and/or de-icer treatment and retention would be underway within the Pond A catchment and at car park Y. However, this/these facility/ies would be constructed offline without any potential impact on the capacity or performance of the existing system.

11.9.8 General airfield construction activities have the potential to impact on all watercourses. These impacts may include the following:

- Increase to suspended sediment loads due to channel disturbance from working in the channel, and runoff from construction areas. Impacts sediment transport and bed substrate downstream;
- Increase in potential for erosion of bed and banks due to excavation and earthworks, and removal of riparian vegetation;
- Loss of and damage to riparian vegetation due to vegetation clearance; and
- Disruption of quantity and dynamics of flow and sediment supply, due to changes in bed and bank form.

11.9.9 The airfield construction works would only have a limited impact in relation to water quality on the water bodies, predominantly because of distance away from any surface waterbodies, limited pathways, and mitigation during construction implemented through the CoCP.

11.9.10 Best practice measures to mitigate the construction impacts (implemented through the CoCP) would substantially control these impacts. The duration of these impacts would be medium term and the magnitude of the impact on Gatwick Stream (high sensitivity), River Mole (high sensitivity), Crawter's Brook (high sensitivity), Burstow Stream (medium sensitivity) and Burstow Stream Tributary (low sensitivity) would be negligible adverse. This would result in a **minor adverse** effect for Gatwick Stream, River Mole, Crawter's Brook and Burstow Stream, and a **negligible** effect for Burstow Stream tributary. This is not considered to be significant.

11.9.11 Construction of the diversion of the River Mole would begin in 2024. This would require excavation and earthworks along a 400 metre length in the floodplain adjacent to the existing channel. The existing channel would be infilled along this section, and the upstream and downstream of the diversion channel would be reconnected to the main watercourse. These activities may impact the existing watercourse through:

- destabilisation of banks due to bank top loading and ground vibration;
- damage to bank face due to modification and removal of bank material;
- destabilisation of banks due to vegetation clearance, as vegetation binds the bank material and draws water;
- disruption of quantity and dynamics of flow and sediment supply, due to changes in bed and bank form, channel planform, cross-section and gradients, as the channel adjusts; and
- loss of existing bed forms and sediment, due to infilling of the original channel.

11.9.12 Best practice measures implemented through the CoCP and the offline construction of the diversion of the River Mole channel would reduce the release of fine sediments and the likelihood

of any unexpected large-scale change. Given the range of potential impacts, the length of the channel potentially impacted and the temporary nature of the impacts, the magnitude of the impact is considered low adverse on a high sensitivity receptor, resulting in a **minor adverse** effect, which is not considered significant.

11.9.13 The River Mole diversion and provision of floodplain compensation areas, which involve the lowering of ground levels are considered to provide the most detrimental impacts to the water bodies, mainly for their effects on habitat and fish during construction. During construction of the River Mole diversion, the magnitude would be considered low adverse in terms of water quality/Water Environment Regulations status elements on a receptor of high sensitivity, with potential deterioration of the Water Environment Regulations status elements, particularly biology over the short-term. This would result in a **minor adverse** effect during this phase which would not be significant

11.9.14 Construction of the culvert extension and re-provisioning of siphon to the north of the northern runway would have the permanent effect of loss of existing bed and bank form and material, and riparian vegetation. This could result in localised disruption of quantity and dynamics of flow and sediment supply. The length of the culvert extension is approximately 45 metres, covering the existing channel which has been heavily modified in the past. The mitigation outlined in the CoCP reduces the impact by re-establishment of riparian vegetation and minimising the area impacted. The area potentially impacted would also be relatively small, and part of the existing culvert would be replaced. There is the potential to increase suspended sediment loads due to channel disturbance from working in the channel. This would have a localised impact on the geomorphology of the channel due to the CoCP mitigation that will be put in place to reduce these impacts. The magnitude of the impact would be negligible resulting in a **minor adverse** effect which is not considered significant.

11.9.15 The works to create the Museum Field FCA would involve lowering the existing ground level by up to approximately 3.5 metres (this is the maximum excavation depth as existing ground levels vary). The flood compensation area would connect to the River Mole via a spillway which would involve lowering the watercourse bank. Impacts on the River Mole (high sensitivity) could include sediment pollution and a change in bed form. However, with the implementation of the best practice measures through the CoCP, the magnitude of the impact is assessed as low adverse resulting in a **minor adverse** effect on the River Mole. This is not considered to be significant.

11.9.16 The construction of a new flood compensation area is proposed East of Museum Field between the River Mole diversion and Museum Field flood compensation area . This would require lowering of the ground levels on the floodplain by up to approximately 1.8 metres below ground level. The area is expected to be returned to grassland following completion of the excavation works. These activities could have the effect of increased sediment loading within the River Mole (high sensitivity) during construction. However, with the implementation of the best practice measures through the CoCP and given that the flood compensation area is setback from the watercourse, the magnitude of the impact is assessed as negligible adverse resulting in a **minor adverse** effect on the River Mole. This would not be significant.

11.9.17 The works to provide the car park X flood compensation area, would involve lowering of the car park ground level. The flood compensation area would connect to the River Mole downstream via a concrete outfall. Construction of the concrete outfall headwall on the River Mole (high sensitivity) would have the effect of change in bank form, sediment pollution and localised

changes to flow and sediment supply and could impact on hydromorphological elements of the Water Environment Regulations status for this water body. With the implementation of the best practice measures through the CoCP and given the length of channel impacted would be relatively small, the magnitude of the impact is negligible resulting in a **minor adverse** effect which would not be significant.

11.9.18 Ground lowering and increase of the depth of water in the car park X flood compensation area could have the effect of increased sediment loading within Crawter's Brook (high sensitivity) during construction. The Water Environment Regulations assessment suggests little change to water body status as a result, although there could be some negligible impacts to sediment variability, floodplain connection, and change to ecological habitat footprints. The flood compensation area also has potential to result in direct effects on biological elements of the Water Environment Regulations, including loss of habitat and fish stranding. The CoCP would mitigate for increased sediment loading to the channel, and any floodplain/watercourse exchange of physical indicators. The area impacted would be relatively small and set back from the watercourse, therefore the magnitude of the impact is considered to be negligible. This would result in a **minor adverse** effect on a high sensitivity receptor, which is not significant.

11.9.19 The effect of the increased use of de-icer due to the increase in ATMs is fully mitigated by the additional storage provided to retain de-icer contaminated runoff, therefore the significance of effect is **negligible**.

Groundwater

11.9.20 Excavation for building foundations and other infrastructure could result in dewatering of the superficial aquifers which could impact on groundwater flows, levels, and ground settlement. Dewatering activities would be minimised where possible with best practice measures, including local control on discharge volumes and drawdown. Potential impacts on changes in water levels and flow, as well as settlement, would be subject to local evaluation as impacts are likely to be localised and short term. Groundwater resource impacts on the secondary A superficial aquifers as a whole are expected to be low adverse for these low or medium sensitivity receptors. This would result in a **negligible/minor adverse** effect which would not be significant.

11.9.21 Piling for building foundations could result in the introduction of contaminants or the creation of new contaminant pathways to the secondary A superficial aquifers. Best practice and mitigation measures identified as part of the piling risk assessment would control these impacts. This would result in a low adverse impact on the secondary A superficial aquifers (low or medium sensitivity receptors). This would result in a **negligible/minor adverse** effect, which is not significant.

11.9.22 There are not likely to be impacts from dewatering or piling activities on the deeper Upper Tunbridge Wells Sand aquifer (and any water sources therein) as it is isolated beneath the impermeable Weald Clay resulting in **no change**.

11.9.23 Construction of sub-surface structures could result in the diversion of groundwater flow, mobilisation of contaminants and groundwater flood risk in the superficial aquifers. Local evaluation and best practice would be adopted via the CoCP to ensure sub-surface structures are constructed to minimise impedance to groundwater flow. This would result in a low adverse impact on receptors of low or medium sensitivity. Therefore, the effect would be **negligible/minor adverse** which would not be significant. There are unlikely to be impacts on the deeper Upper Tunbridge Wells Sand aquifer, resulting in **no change**.

11.9.24 Construction of the Museum Field flood compensation area has the potential to intercept shallow groundwater. However, the Museum Field flood compensation area is entirely located on the mapped outcrop of the Weald Clay Formation with no superficial deposits. There is therefore likely to be only minimal groundwater seepage into any excavation. This would result in a low adverse impact on receptors of low sensitivity. Therefore, the effect would be **negligible** which would not be significant.

11.9.25 Spillage of contaminants at the surface could impact the quality of groundwater. Best practice measures to mitigate the construction impacts (implemented through the CoCP) would substantially control these impacts. The duration of these impacts would be medium term and the magnitude of the impact on the secondary A superficial aquifers as a whole are expected to be low adverse for these low or medium sensitivity receptors. This would result in a **negligible/minor adverse** effect which would not be significant.

Flood Risk

Surface Water Flood Risk

11.9.26 Existing surface water flow paths may be interrupted, diverted or created by construction works, due to increased compaction of ground, increase in impermeable area, or by level changes as a result of temporary works. The discharge of groundwater as a result of dewatering of foundations, basement and other sub-surface structures could result in changes to surface water flow paths. Therefore, any increase in surface water runoff that could potentially not be conveyed by the existing drainage system would be managed on site or dealt with through temporary drainage. This could result in a negligible magnitude of impact (ie <10 mm change in flood depth) on all receptors, although no specific instances where this is likely have been identified at this stage. This would result in a **minor adverse** effect for residential properties (high sensitivity), transport infrastructure (very high sensitivity) and airport infrastructure (very high sensitivity); and a **negligible/minor adverse** effect on industrial properties (medium sensitivity) and airfield non-operational areas (low sensitivity). These effects are not considered to be significant.

11.9.27 Increased surface water flood risk could also occur as a result of changes in rates and volumes of surface water runoff being discharged into the existing drainage system. As mentioned in Section 11.8 and in accordance with the CoCP, the drainage system would be designed to ensure it has adequate capacity to store any additional surface water runoff at all stages of the construction phase. Therefore, any increase in surface water flood risk would result in **no change** to residential and industrial properties, and transport infrastructure, and a negligible adverse impact on airport infrastructure and grassed areas. The effect on airport drainage infrastructure therefore has been assessed as **minor adverse** and **negligible/minor adverse** for airfield infrastructure and grassed areas respectively. These effects are not considered to be significant.

Fluvial Flood Risk

11.9.28 Loss of floodplain storage could occur due to construction activities in floodplain areas, including the introduction of construction compounds and works in river channels (eg for outfalls), increasing fluvial flood risk. The receptors considered in the assessment of flood risk have been identified as: residential properties (high sensitivity), industrial properties (medium sensitivity), transport infrastructure (very high sensitivity), airport infrastructure (very high sensitivity) and airfield grassed areas (low sensitivity).

11.9.29 The airfield satellite contractor compound (programmed to be established in 2024) would be located adjacent to the River Mole and falls within the floodplain. It has been assumed that this compound would be flood protected with a bund. Sections of the Museum Field, car park Y and car park X solutions would be implemented within this period (in advance of loss of floodplain), mitigating the risk of flooding from the loss of floodplain from the airfield satellite contractor compound. All other proposed construction compounds are expected to be located outside of flood risk areas.

11.9.30 Hydraulic modelling has been undertaken to assess the impact of the construction compound on flood risk using the 1 per cent (1 in 100) AEP event including a 25 per cent climate change allowance. A 25 per cent allowance is in accordance with Environment Agency guidance (EA, 2016a) for the construction timeframe. It has been shown that there would be no adverse impacts to flood risk expected due to the introduction of the construction compound with mitigation in place, including suitable construction phasing applied prior and during construction (see Section 11.8). The compensation measures proposed to mitigate the loss of floodplain would also offer betterment (mainly up to 50 mm flood depth decrease) in several areas within and outside of the Project site boundary. Full details of the change in flood depth as a result of the Project are presented in the FRA (Appendix 11.9.1).

11.9.31 The diversion of the River Mole has potential to increase flood risk due to the temporary works required within the river channel and the floodplain to enable the diversion to be safely undertaken. The works would be programmed to ensure that as much of the new channel as practicable is completed prior to any loss of existing channel capacity. Any loss of channel capacity would therefore be of minimal duration and the contractor would have measures in place, such as temporary pumps, to ensure that there is no increase in flood risk should a flood event occur during this time.

11.9.32 The eastern end of the proposed car park at Crawter's Field (Purple Parking replacement) would be within the floodplain, however it is assumed that this would be located at existing ground level to avoid reducing available floodplain storage. This will also cause an increase in impermeable area, however it is assumed that this will be dealt with through provision of suitable drainage for the car park to ensure no increase in flood risk.

11.9.33 Despite the loss of existing floodplain (fluvial flooding) as a result of the Project the provision of the associated embedded mitigation measures reduces flood risk to residential and industrial properties compared to the baseline resulting in a **minor beneficial** effect (not significant). There would be no change to the risk of flooding to transport infrastructure and a negligible beneficial impact and **minor beneficial** effect (not significant) on airport infrastructure. The change in flood risk to the grassed areas of the airfield would result in a negligible beneficial impact to some areas resulting in a **negligible/minor beneficial** effect, and a high adverse impact and a **minor adverse** effect to others. These effects are not considered to be significant.

Groundwater Flood Risk

11.9.34 Increase in the risk of groundwater emergence could occur as a result of construction activities lowering ground levels or impeding groundwater flows. As stated in paragraphs 11.9.20 to 11.9.25, with appropriate mitigation the impact on groundwater is anticipated to be minor. This also applies to the impact on groundwater levels and therefore the risk of groundwater flooding. Appropriate mitigation and construction measures, as set out in the CoCP, would be anticipated to mitigate any increase in groundwater levels as a result of the construction and therefore any

change would be of negligible magnitude (less than 10 mm change in depth). This would result in a **minor adverse** effect for residential properties (high sensitivity), transport infrastructure (very high sensitivity) and airport infrastructure (very high sensitivity); and a **negligible/minor adverse** effect on industrial properties (medium sensitivity) and airfield non-operational areas (low sensitivity). These effects are not considered to be significant and no specific instances where this is likely to occur have been identified at this stage.

Water Infrastructure – Wastewater

11.9.35 Discharges to the wastewater network by construction workers and construction activities are estimated to increase the peak system loading by 1 per cent. Hydraulic modelling has been undertaken to determine the impact of the additional flows, which are very small compared to the normal daily flows and demonstrated to be well below the available capacity of the network and treatment facilities. As a result, the impact of the construction on the Gatwick wastewater network (medium sensitivity) has been assessed as negligible with an effect of **negligible/minor adverse** and would not be significant.

Water Infrastructure – Water Supply

11.9.36 Increased water consumption would be expected through staff welfare facilities and construction processes, eg vehicle washes and concrete pouring. Temporary water supply points to support construction would be agreed and metered to monitor consumption. Calculations have been undertaken to determine the additional demands on water supply and these have been deemed to have a negligible impact on the Gatwick potable water supply (low sensitivity). This would result in a **negligible/minor adverse** effect which is not considered to be significant.

Further Mitigation

11.9.37 Whilst there would be temporary impacts on all aspects on the water environment during the construction phase, with the application of best practice construction practices (as set out in the draft CoCP in Appendix 5.3.1), the potential impacts would be reduced to an acceptable level. No further mitigation is proposed at this stage.

Future Monitoring

11.9.38 No additional monitoring beyond that currently undertaken by GAL (eg monitoring of outfall water quality to ensure compliance with discharge consents) is anticipated as a result of the Project for the water environment during construction.

Significance of Effects

11.9.39 The significance of the effects on the water environment during this phase of the Project would remain as set out in the assessment above as no further mitigation has been identified.

First Full Year of Opening: 2029 (up to 2032)

11.9.40 According to the proposed construction phasing programme, all of the proposed flood mitigation measures (except for the Gatwick Stream flood compensation area) would have been completed by the first full year of opening; Museum Field, east of River Mole and car park X flood compensation areas. Further details on the phasing of mitigation are provided in the Flood Risk Assessment (Appendix 11.9.1). After 2029, the main works that could impact fluvial flood risk would be the proposed surface access improvement works which would include their own

mitigation measures and the satellite airfield contractor construction compound that would encroach on the floodplain would remain until 2032.

Surface Water

11.9.41 During the first full year of opening, change to the geomorphology of surface waterbodies is expected to continue as the watercourses adapt and adjust to construction works associated with various watercourses. Best practice measures to mitigate the construction impacts would continue to control the impacts. The impact on the surface water bodies would be negligible. This would result in a **minor adverse** effect for Gatwick Stream, River Mole, Crawter's Brook and Burstow Stream, and a **negligible** effect for Burstow Stream Tributary. This is not considered to be significant.

11.9.42 The North Terminal highway works are setback from Gatwick Stream (high sensitivity), however there is the potential for sediment pollution due to runoff from construction areas. Outfalls would be constructed on the River Mole (high sensitivity) and Gatwick Stream connecting to a highway drainage attenuation tank and pond, respectively. The construction of the outfall headwalls would impact the watercourse by localised disruption of quantity and dynamics of flow and sediment supply. This would occur due to localised damage to the bank face during modification and removal of bank material and riparian vegetation, and temporary release of fine sediments into the watercourse. With the implementation of best practice measures through the CoCP and given that works only require a small area of the bank for the outfall, the magnitude of the impact of these works is considered negligible adverse, resulting in **minor adverse** effect which is not significant.

11.9.43 Improvements to the South Terminal roundabout would commence towards the end of this period. The works would have adverse impacts to biological elements in Gatwick Stream during construction. Suspended sediment concentrations and runoff carrying particles and road borne contaminants have the potential to cause higher suspended sediment concentrations in the water bodies, which could directly impact on fish, macrophytes and invertebrates. Best practice measures implemented through the CoCP would aim to control this impact. Therefore, the impact on Gatwick Stream (high sensitivity) during the construction of the South Terminal roundabout would be low adverse, resulting in a **minor adverse** effect, which is not considered to be significant.

11.9.44 The South Terminal highway works include the widening of the M23 spur road and extending the culvert at Burstow Stream Tributary (low sensitivity). A highway drainage attenuation basin is also proposed, connected to Burstow Stream Tributary downstream of the culvert via an outfall drain. The works would also require modification and improvements to an existing attenuation pond, and the drains and outfalls which connect to Burstow Stream (medium sensitivity). There is potential for localised disruption of quantity and dynamics of flow and sediment supply, and release of fine sediments into the channels during construction. The impacts on the geomorphology of the watercourse would be mostly temporary with the provision of best practice measures adopted through the CoCP; therefore, the effects would be **minor adverse** which is not significant.

11.9.45 Construction of new surface access arrangements at Longbridge Roundabout would be completed in 2032. The works would include widening the existing overbridge at the River Mole by 5-6 metres, development in the floodplain to accommodate widening and modifications to the A23 and two concrete outfall headwalls connecting the highway drainage attenuation basins to

the River Mole (high sensitivity). These activities may impact the watercourse by disruption of quantity and dynamics of flow and sediment supply. This would occur due to localised damage to the bank face during modification and removal of bank material and riparian vegetation, and temporary release of fine sediments into the watercourse, including runoff from construction areas. This would have a temporary and localised impact on the geomorphology of negligible magnitude on the channel of the River Mole (high sensitivity) due to the CoCP mitigation that would be put in place. The effects would be **minor adverse** which is not significant.

11.9.46 Relocation of Pond A could improve biological quality of the Water Environment Regulations status of the relevant water bodies, and improve over habitat functioning, species quality and quantity, as well as water quality indicators. Given the range of potential impacts, the length of the channel potentially impacted and the temporary nature of the impacts, the magnitude of the impact is considered low beneficial on the River Mole (a high sensitivity receptor), resulting in a **minor beneficial** effect, which is not considered significant.

11.9.47 During 2029 there is likely to be little change or improvement in Water Environment Regulations status elements as the waterbodies would be adapting to changes that have occurred during earlier construction activities. While there is inherent uncertainty as to how long it would take for the waterbodies to reach equilibrium, where this is likely to occur (site-specifically), the geomorphic systems are not highly dynamic so are unlikely to exhibit uncontrolled changes of high magnitude.

11.9.48 The effect of the increased use of de-icer due to the increase in ATMs has been assessed for the design year 2038 only. The increase in ATMs and de-iced pavement area in 2038 represents the worst case for this parameter and therefore no interim assessment has been undertaken. Until the detailed modelling has been completed, the timing of provision of mitigation through the new car park Y facility cannot be determined. However, full mitigation required for the 2038 maximum design scenario would be provided prior to 2029, and before any possible deterioration occurs. Further detail about the timing of provision of mitigation will be provided in the ES.

Flood Risk

11.9.49 No further additional effects on flood risk above those assessed in the initial construction phase would be anticipated as a result of the continued construction works in this time period.

11.9.50 Hydraulic modelling results have shown that no additional significant effects would be anticipated as a result of loss of floodplain due to surface access works commencing in 2029, for the 1 per cent (1 in 100) AEP event including a 25 per cent climate change allowance. This is due to the implementation of mitigation measures earlier in the programme which would be sufficient for this phase of the Project. Any additional construction activities required within the floodplain to enable these works may require temporary mitigation measures to prevent a loss of floodplain and therefore increase in flood risk although the increase in floodplain storage from implementing most mitigation measures in Phases 1 and 2 would provide sufficient compensation.

Groundwater

11.9.51 No additional effects on groundwater above those assessed in the initial construction phase would be anticipated as a result of the continued construction and operation commencing in 2029. Therefore, no further assessment has been undertaken for this period.

Water Infrastructure - Wastewater

11.9.52 The first full year of opening would see peak daily passenger numbers increase by approximately 6 per cent from 2029, compared to the 2029 future baseline (which would be an increase of 14 per cent on the 2018 baseline). The increase in foul water flows would add to the foul system loading throughout the network so would have a potential long-term impact on the foul drainage system. Compared to the baseline for 2029, the Project foul system flows would be a maximum of 5 per cent higher for the dry weather cases, but 8 per cent lower for the wet weather cases due to the proposed mitigation works and changes in land use associated with the Project which would divert storm flow out of the foul system. Hydraulic modelling of this increase predicts that the impact on the Gatwick Airport wastewater infrastructure network (medium sensitivity) would be negligible resulting in a **negligible** effect, that would consequently not be significant. This is due to the wastewater network having adequate capacity to accommodate the increase in flows as a result of additional passengers and the demand from construction workers.

Water Infrastructure - Water Supply

11.9.53 Existing SESW infrastructure would be able to meet the demands of increased passenger numbers during this period both from baseline increases and as a result of the Project. The demands of construction activities would be relatively small in comparison and consequently combined they would be considered to have a negligible impact on the Gatwick Airport potable water supply (low sensitivity). This would result in a **negligible/minor adverse** effect which is not considered to be significant. Through consultation, SESW has provisionally confirmed that their sources and network can meet the additional demands of the Project during construction, including the increase in passenger numbers, subject to the outcome of their full impact assessment.

Further Mitigation

11.9.54 All impacts during this phase are not considered significant and therefore no further mitigation is proposed.

Future Monitoring

11.9.55 No additional monitoring beyond that currently undertaken by GAL (eg monitoring of outfall water quality to ensure compliance with discharge consents) would be required as a result of the Project for the water environment.

Significance of Effects

11.9.56 No further mitigation has been identified, therefore the residual effect of the Project on the water environment in this assessment year would remain as outlined above.

Interim Assessment Year: 2032 (up to 2037)

Surface Water

11.9.57 In this phase of the Project, the effects of construction works on the watercourses (undertaken in earlier phases of construction) would have stabilised, and it is not anticipated that there would be any further adverse effects. The implementation of the CoCP would be expected to address construction related impacts such as increases in suspended sediment concentrations.

11.9.58 It is likely that the effects of earlier construction activity would no longer be noticeable in the water body elements under the Water Environment Regulations. Further, it would be difficult to ascertain the source of any changes occurring in the relevant water bodies – whether these are as a result of the Project or because of changes elsewhere in the water body or catchment. Therefore, no additional effects during the interim assessment year have been assessed for this reason.

11.9.59 The works to create the Gatwick Stream flood compensation area would be undertaken from 2036. The works would involve lowering the existing ground level by up to 3 metres (this is the maximum excavation depth as existing ground levels vary). The flood compensation area would connect to the watercourse by lowering the stream bank. Impacts on the Gatwick Stream (high sensitivity) could include sediment pollution and a change in bed form over time. However, with the implementation of the best practice measures through the CoCP, the magnitude of the impact is assessed as low adverse resulting in a **minor adverse** effect on Gatwick Stream. This is not considered to be significant.

11.9.60 No additional effects would be anticipated for the interim assessment year. The continued construction of some airfield works (eg Pier 7, internal access works, car park Y and the North Terminal Long Stay car park) and highways works (Longbridge roundabout) would incorporate best practice measures to reduce pollution to watercourses and the implementation of previous mitigation features (such as the tanking at car park Y) would be adequate to mitigate any effects that could occur. Therefore, no further assessment has been undertaken for this period.

11.9.61 As stated in paragraph 11.9.48 the effect of the increased use of de-icer due to the increase in ATMs has been assessed for the design year 2038 only. The increase in ATMs and de-iced pavement area in 2038 represents the worst case for this parameter and therefore no interim assessment has been undertaken. Until the detailed modelling has been completed, the timing of provision of mitigation through the car park Y facility cannot be determined. However, full mitigation required for the 2038 Maximum Design Scenario would be provided before any deterioration occurs. Further detail about the timing of provision of mitigation will be provided for the ES.

Groundwater

11.9.62 There may be additional excavation for building structures, basements, piling etc. (eg Pier 7 foundation works, and below ground works for pumping stations and substations). These could result in dewatering of the superficial aquifer which could impact on groundwater flows, levels, and ground settlement. Dewatering activities would be minimised where possible with best practice measures, including local control on discharge volumes and drawdown. Potential impacts on changes in water levels and flow, as well as settlement, would be subject to local evaluation as impacts are likely to be localised and short term. Groundwater resource impacts on the secondary A superficial aquifers as a whole are expected to be low adverse for these low or medium sensitivity receptors. This would result in a **negligible/minor adverse** effect which would not be significant.

11.9.63 Excavation of the Gatwick Stream flood compensation area appears to be away from the superficial aquifer and overlies the mapped Weald Clay outcrop, which contains little or no groundwater. In this case there would be no impacts on groundwater resources from this excavation. However, the lower aquifer (Upper Tunbridge Wells Sand) is mapped as outcropping within about 5 metres to the south / south west. If the Weald Clay is thin and shallow in this

location (which may only be confirmed by local ground investigations), the excavation may locally penetrate the top of this lower aquifer. Groundwater levels (in the Upper Tunbridge Wells Sand) at this location are unknown; however, it is understood that the existing flood compensation area does not suffer from groundwater ingress and as such groundwater levels within the Upper Tunbridge Wells Sand are unlikely to be shallow. If the top of the aquifer is penetrated, appropriate construction measures and practices will need to be adopted, for example, to prevent contamination from entering the aquifer or to control groundwater seepage. Any local impacts from construction are likely to be short term only and negligible or at worst low adverse. The Upper Tunbridge Wells Sand aquifer is of medium sensitivity (though high sensitivity in terms of Water Environment Regulations) but overall (and taking into account the short term nature of the impact) the significance of the effect is considered to be **minor adverse** and would not be significant.

Flood Risk

11.9.64 According to the proposed construction phasing programme, all primary works that could affect current flood risk would have been completed by 2029. The measures implemented by this stage would be adequate to ensure no further increase in flood risk would occur. Additional mitigation in the form of the Gatwick Stream flood compensation area would be provided in 2036 in order to comply with future climate change adaptation requirements. Other construction works at this time would have potential to alter surface water flow paths or temporarily increase runoff. The impact of this would be anticipated to be as described in 11.9.26, with no significant effects anticipated once appropriate mitigation is applied in accordance with the CoCP.

Water Infrastructure - Wastewater

11.9.65 The interim assessment year 2032 would see peak daily passenger numbers increase by approximately 19 per cent compared to the 2032 future baseline. The increase in foul water flows would add to the foul system loading throughout the network so would have a potential low long-term impact on the foul drainage system. Compared to the future baseline for 2032, the Project foul system flows are a maximum of 10 per cent higher for the dry weather cases, but 6 per cent lower for the wet weather cases due to the proposed mitigation works and changes in land use associated with the Project which would divert storm flow out of the foul system. The foul sewerage system (of medium sensitivity) has adequate capacity to accommodate the increase in flows. The impact of the Project is therefore assessed as negligible adverse magnitude resulting in a **negligible** effect, that is not considered to be significant.

Water Infrastructure - Water Supply

11.9.66 This phase would see an increase in water demand due to the increase in passengers. Although unconfirmed, SESW has indicated that the projected increase in demand would likely not have an adverse impact on the water source. Therefore, there would be **no change** compared to the 2032 future baseline.

Further Mitigation

11.9.67 No additional significant effects during the interim assessment year have been assessed as part of this study and therefore no additional mitigation is proposed for the water environment.

Future Monitoring

11.9.68 No additional significant effects during the interim assessment year have been assessed as part of this study, therefore no additional monitoring beyond that currently undertaken by GAL (eg monitoring of outfall water quality to ensure compliance with discharge consents) is anticipated as a result of the Project for the water environment.

Significance of Effects

11.9.69 No significant effects have been identified once the proposed mitigation is included.

Design Year: 2038

11.9.70 This section describes the potential effects of the Project on the water environment during the operational phase.

11.9.71 In order to assess the effects due to the Project, each identified impact has been assigned a magnitude after considering the embedded mitigation designed as part of the Project. Mitigation measures adopted as part of the Project have been described in Section 11.8.

11.9.72 For the purpose of this assessment, the classification of impact magnitude also takes into account impact duration. For the operational phase of the Project, all impacts are considered to have a 'long term' duration, defined as a period of more than five years.

Surface Water

11.9.73 An increase in contaminated runoff from additional pavement area and additional de-icer use associated with the increased ATMs could affect surface water bodies if not mitigated by the Project. The additional impermeable area created as part of taxiway and runway reconfiguration would increase the area of hardstanding that is de-iced. This would increase the de-icer load in runoff arriving at Ponds A, M and D. Additional contaminated runoff storage and/or treatment is included at Dog Kennel Pond and under car park Y, which would fully mitigate any potential impact on water quality from intermittent discharges to the River Mole, or any impact on Crawley sewage treatment works. The change in pavement de-icer significantly decreases the load discharged to the River Mole.

11.9.74 By 2038 these measures would be fully in place and would ensure no deterioration of the waterbodies. Therefore, the impact on the water quality of the River Mole and Gatwick Stream (high sensitivity) as a result of runoff from the increased hardstanding would be negligible. This would result in a **minor adverse** effect which is not considered to be significant.

11.9.75 The diversion of the River Mole into a two-stage channel included the reinstatement of a more natural planform and restoration of more natural morphology. During operation, this would have a long-term effect of improving the flow regime and channel diversity. There would also be floodplain and re-meandering improvements along with improvements in floodplain coupling. Planting of natural floodplain vegetation would improve riparian habitats and improve bank stability. The duration of these impacts would be long term and the magnitude of impact on the River Mole (high sensitivity) would be medium beneficial. The effects would be considered as **moderate beneficial** and therefore considered significant.

11.9.76 There would, however, be the potential for a reduction in water velocity along the river diversion in the long term, which may cause deposition at this location, along with sediment starvation and

erosion downstream. These changes would arise due to the changes in cross-sectional form and channel gradient. The potential length of the channel impacted by the effects of reduced velocity in the watercourse could be substantial, as it would include the channel diversion from the runway culvert downstream beyond the diversion. The diversion channel would be designed as a suitable river type for the bed gradient of the realignment in order to maintain sediment transport capability. The magnitude of the effect would be to low adverse and the significance of the effect on the River Mole would be **minor adverse**, and not considered significant. Further detailed design work and modelling on the diversion channel is required as the Project progresses and will be assessed within the ES.

11.9.77 The extension of the River Mole culvert and concrete lining underneath the runway would have the permanent effect of loss of existing bed and bank form, material, and riparian vegetation. The length of the culvert extension is approximately 45 metres, covering the existing channel which has been heavily modified in the past. The increased homogeneity of the new channel cross-section would create the potential for minor loss of natural variance in velocities and secondary flows cells, leading to changes in velocity and geomorphological processes. The potential length of the channel impacted by the changes in geomorphological processes would be relatively small, and part of the existing culvert would be replaced. Furthermore, provision of geomorphological mitigation to the diversion channel of the River Mole acts to more than compensate these effects. Therefore, the magnitude of the impact is assessed as negligible on the River Mole resulting in a **minor adverse** effect, which is not considered significant.

11.9.78 The River Mole diversion and culvert extension would have various effects on the watercourse, some adverse and some beneficial. The geomorphological mitigation on the River Mole diversion valley and mitigation for the adverse effects included in the construction and design of the diversion channel show that beneficial effects outweigh the adverse effects.

11.9.79 The creation of the Museum Field flood compensation area and connecting spillway as well as the East of Museum Field and east of Gatwick Stream flood compensation area would improve floodplain-channel coupling, and naturalisation of flows in the main channel during flood conditions. Lowering the banks of the River Mole and Gatwick Stream to connect these watercourses to the floodplain compensation areas would result in the loss of existing bank form. These alterations to the baseline could encourage erosion of the banks and bed along the connecting spillway during flood events. The length of bank impacted in both cases would however be relatively small and set back from the watercourses, however the banks would not be entirely natural. Furthermore, enough time would have passed since the construction phase for the river to naturally adjust and for vegetation to establish on the banks to aid bank stability. The potential for erosion along the spillways during flood events would remain which would result in a low impact of a long-term duration on both the River Mole and Gatwick Stream. This would result in a **minor adverse** significance of the effect for both receptors (of high sensitivity) which is not considered to be significant.

11.9.80 Construction of the concrete outfall headwall from the flood attenuation basin in car park X would have the effect of loss of existing bank and riparian vegetation on the River Mole and localised changes to sediment transfer and flow patterns in the channel. By 2038, sufficient time would have passed since the construction phase for the river the naturally adjust. The length of channel impacted would be relatively small, therefore the magnitude of the impact would reduce to negligible resulting in a **minor adverse** effect which is not significant.

11.9.81 Ground lowering and increase of the depth of water in the floodplain in car park X would have the effect of reduction in area of floodplain-channel coupling with Crawter's Brook (high sensitivity) in the long term. The CoCP would mitigate for increased sediment loading to the channel and any floodplain/watercourse exchange of physical indicators but cannot change the coupling effect of the floodplain which would be considered in design. The area impacted would be relatively small and set back from the watercourse, therefore the magnitude of the impact is considered to be negligible. This would result in a **minor adverse** effect on a high sensitivity receptor, which is not significant.

11.9.82 The South Terminal new surface access arrangements would result in long-term changes to the geomorphology of Burstow Stream Tributary (low sensitivity) which is currently culverted underneath the M23 spur. Extension of the existing culvert to accommodate road widening, and the new concrete outfall headwall connecting to the highway drainage attenuation basin, would result in permanent loss of natural bank form and riparian vegetation. The increased homogeneity of the channel cross-section has the potential for loss of natural variance in velocities and secondary flow cells, leading to changes in velocity and geomorphological processes in the channel. There is existing concrete lining upstream and downstream of the culvert and only a relatively small area would potentially be impacted. The long-term impact on the Burstow Stream Tributary has a **negligible adverse** effect, which is not considered to be significant.

11.9.83 The South Terminal new surface access arrangements would result in long-term changes to the geomorphology of Burstow Stream (medium sensitivity). Widening of the M23 spur, and modifications and improvements to an existing attenuation pond, drains and outfall connecting to Burstow Stream would result in the permanent loss of existing banks and localised changes to sediment transfer and flow patterns in the channel. Flow control on the outfall drain and filtering of pollutants would reduce the impact on flow and sediment transfer. Permanent change to the baseline would also include loss of floodplain and natural vegetation due to encroachment of highway footprint onto existing natural floodplain. The length of channel impacted is relatively small as existing structures will be modified and/or improved. The works on the floodplain are also setback from the watercourse. The long-term impact on the Burstow Stream has a **minor adverse** effect, which is not considered to be significant.

11.9.84 The North Terminal new surface access arrangements would result in long-term loss of floodplain and natural vegetation due to encroachment of highway footprint onto existing natural floodplain. The footprint of the highway works would however be set back from the banks of Gatwick Stream (high sensitivity). The highways works would also result in a localised reduction in floodplain-coupling. Construction of the outfall headwalls on the River Mole (high sensitivity) and Gatwick Stream connecting to the highway drainage attenuation basins results in permanent loss of natural banks and localised changes to sediment transfer and flow patterns in the channel. The length of channel impacted is relatively small. In terms of geomorphology of the watercourse the impact has been assessed as negligible resulting in a **minor adverse** effect on a high sensitivity receptor, which is not significant.

11.9.85 The Longbridge Roundabout new surface access arrangements would result in long-term loss of floodplain and natural vegetation due to encroachment of highway footprint onto existing natural floodplain of the River Mole (high sensitivity). Construction of the two new concrete outfall headwalls connecting the highway drainage attenuation basins and widening of the existing overbridge would result in permanent loss natural bed and bank form, and natural riparian vegetation. The increased homogeneity of the channel cross-section has the potential for loss of

local natural variance in flow, effecting geomorphological processes in the channel. The impact on the geomorphology of the watercourse has been assessed as negligible resulting in a **minor adverse** effect on a high sensitivity receptor, which is not significant.

11.9.86 During operation there would be an improvement to hydromorphology and water quality (chemical) elements in the River Mole and the surface water attenuation and treatment ponds. The pathway between surface water runoff and the Gatwick Stream would be reduced as a result of the surface water drainage design. However, it is unlikely to be sufficient to result in a betterment. Therefore the impact has been assessed as low beneficial resulting in an effect of **minor beneficial**. This is considered to be not significant.

11.9.87 Following the construction of the South Terminal roundabout there would be an improvement to hydromorphology and water quality (chemical) elements of Gatwick Stream compared to the baseline. During operation the pathway between the road and the watercourse which existed during construction would be removed improving water quality elements at the receptor. This is due to the Project highway drainage design, leading to an overall beneficial impact. This would result in a low beneficial impact on Gatwick Stream with a **minor beneficial** effect, which is not considered to be significant.

11.9.88 The North Terminal highway works would have impacts on Burstow Stream during construction, including increased suspended sediment concentrations, disturbance to species and habitats, and potential change to water quality. During operation, however, there is potential for a change to Burstow Stream in terms of Water Environment Regulations elements. This would incorporate potential opportunity for betterment with regards to water quality and the effect this would have on biological quality elements. Overall, this would not improve the water body Water Environment Regulations status as a whole. The opportunity of recovery during operation would occur as the pathway between the road and the watercourse would be reduced. This is due to the Project highway drainage design, leading to an overall low beneficial impact. Therefore, the effect on Burstow Stream of medium sensitivity would be **minor beneficial** and not significant.

Groundwater

11.9.89 During operation of the Project, there would be a long term change in the amount of hardstanding compared to the baseline (eg additional hardstanding for runways, taxiways and aprons). However, this increase is considered to be a small proportion of the overall recharge area within the airport and is unlikely to bring about significant change in the recharge of groundwater to the shallow superficial aquifers. Therefore, the impact has been assessed as low adverse resulting in a **negligible/minor adverse** effect on the Secondary A superficial aquifers of low or medium sensitivity. This is not considered to be significant.

11.9.90 Where potential effects on groundwater flow are identified from below ground structures (eg piled foundations), these may be addressed by adopting appropriate design of permanent works to eliminate upstream mounding and flow diversion. Impacts on groundwater flow are likely to be short to medium term and groundwater levels are expected to equalise over time. The impact on the Secondary A superficial aquifers therefore has been assessed as low adverse resulting in a **negligible/minor adverse** effect on the Secondary A superficial aquifers of low or medium sensitivity. This is not considered to be significant.

11.9.91 Loss of groundwater storage within permeable superficial deposits may occur where sub-surface structures lead to the long term loss or removal of the gravel aquifer. This is likely to be only a

small proportion of the available groundwater storage within the superficial aquifer and would have only very minor localised impacts (if any), resulting in negligible adverse impact on receptors of low or medium sensitivity. The resultant effect would be of **negligible/minor adverse** significance which is not considered to be significant.

11.9.92 It is not proposed to discharge from the surface water drainage to ground. However, if the attenuation ponds are unlined the superficial aquifers may receive some recharge. This recharge may be of lower quality water resulting in a reduction in the water quality within the aquifers. This would result in a low adverse effect on a receptor of medium or low sensitivity. The resultant effect would be **minor adverse** which is not considered to be significant. The Museum Field flood compensation area may intercept groundwater within the weathered Weald Clay Formation. Groundwater within the Weald Clay Formation is contained in isolated areas with minimal flow. As such, negligible seepage into the flood compensation area would be anticipated. This would result in a low adverse effect on a receptor of low sensitivity. The resultant effect would be **negligible** which is not considered to be significant.

11.9.93 Long term operational impacts on the lower superficial A Upper Tunbridge Wells Sand aquifer are unlikely to be significant overall. However, if the base of the flood compensation storage area for the Gatwick Stream penetrates the lower aquifer (refer 11.9.63) it is possible the aquifer would receive (intermittent) recharge from within the flood compensation area, when it is brought into operation. Additional recharge to the aquifer (from Gatwick Stream “waters”) could be considered beneficial, particularly if future climate scenarios result in a reduction in overall aquifer recharge. Any such benefit would be of negligible impact. No other project elements are anticipated to penetrate the full thickness of the Weald Clay Formation. The resultant overall effect on the lower aquifer (of medium sensitivity and high sensitivity with respect to Water Environment Regulations) would be **negligible.** This is considered to be not significant.

Flood Risk

Surface Water Flood Risk

Offsite Receptors

11.9.94 The introduction of new impermeable areas as part of the Project could result in increased surface water runoff in the long term, or cause alterations to existing surface water flow paths that could potentially increase flood risk.

11.9.95 It has been shown in Appendix 11.9.1, that the Project would cause a slight increase in discharge volumes and peak runoff rates (by 1.3 per cent and 4 per cent respectively) that could potentially increase flood risk elsewhere. At this stage, it has been considered that such a limited increase would be safely managed and mitigated through provision of additional mitigation in the form of underground storage. Surface water flood extents outside of the Project site boundary are not expected to be directly impacted by the Project and there would be a negligible increase in surface water flood risk. The magnitude of impact on residential properties (high sensitivity), industrial properties (medium sensitivity) and transport infrastructure (very high sensitivity) is therefore considered to be negligible. This would result in **a minor adverse, negligible/minor adverse** and **minor adverse** effect on these receptors respectively. These effects are not considered to be significant.

Airport Infrastructure

11.9.96 The FRA (Appendix 11.9.1) demonstrates that surface water flood risk would increase for the 1 per cent (1 in 100) AEP event, including a 20 per cent allowance for climate change, at some very localised areas of runways, taxiways and stands within the airport boundary. This would be safely managed through the application of Gatwick's Flood Threat Plan.

11.9.97 However, as discussed in Section 11.5, the hydraulic model has not been finalised for surface water flooding performance. In particular, the alterations in ground levels within the airfield due to the Project have not been assessed in this PEIR as the hydraulic model is incomplete. Therefore, the exact locations of flooding cannot be verified. In reality, the proposed runways and taxiways would be raised and, therefore, flooding is very unlikely to occur at the locations that the FRA plans currently indicate. Areas to be used for aircraft movement would be designed with suitable drainage to prevent such surface water flooding, and any potential increase is anticipated to be localised and restricted to grassed areas outside of general use, within the airport boundary.

11.9.98 Given the above, the magnitude of the potential impact to runways and taxiways (very high sensitivity) is considered to be negligible resulting in areas with **a minor adverse** effect and others with a **minor beneficial** effect (not significant).

11.9.99 For all other elements of airport infrastructure (terminals and piers, stands, waste management facilities, and car parking) the change in modelled surface water flood risk would result in impacts ranging from **negligible adverse** to **negligible beneficial** (see Table 11.9.1), and are therefore not considered significant.

11.9.100 For grassed areas of the airfield (low sensitivity), the magnitude of impact is expected to be medium (up to 100 mm of flood depth increase) resulting in a **minor adverse** effect which is not considered to be significant. Table 11.9.1 summarises the effects on each of these receptors.

Table 11.9.1: Summary of Surface Water Flood Risk Effects on Airport Infrastructure

Receptor	Sensitivity	Magnitude	Effect	Significant/not significant
Runways and taxiways	Very high	Negligible	**Minor adverse**	Not significant
Terminals and piers	Very high	No change	**No change**	Not significant
Stands	Very high	Negligible	**Minor adverse**	Not significant
Waste management facilities	Very High	Negligible	**Minor beneficial**	Not significant
Car parking	Medium	Negligible	**Minor beneficial**	Not significant
Grassed areas	Low	Medium	**Minor adverse**	Not significant

Fluvial Flood Risk

Offsite receptors

11.9.101 Elements of the Project that fall within the floodplain could lead to a loss of floodplain storage and increase fluvial flood risk. However, a number of floodplain compensation/storage areas have been incorporated into the design as embedded mitigation to ensure any potential impact would be reduced.

11.9.102 Fluvial hydraulic modelling results (see Figure 11.9.1), for the 1 per cent (1 in 100) AEP event, including a 35 per cent climate change allowance, show that for third party receptors, including residential and industrial properties, anticipated flood depths would decrease by up to 100 mm for those receptors adjacent to Gatwick. Therefore, the overall impact of the Project on residential properties (high sensitivity) and industrial properties (medium sensitivity) would be medium beneficial, resulting in an effect of **moderate/major beneficial** and **moderate beneficial** respectively. This is considered to be a significant beneficial effect.

11.9.103 Fluvial flood risk for major transport infrastructure is not expected to be affected by the Project in the long term therefore the impact is therefore classified as **no change**.

Airport Infrastructure

11.9.104 In terms of airport infrastructure, for the 1 per cent (1 in 100) AEP event, including a 35 per cent climate change allowance, most areas would benefit from the development of the Project. Flood depths would be decreased by up to 100 mm (medium beneficial impact) for taxiways and proposed car parking areas, and up to 50 mm (low beneficial impact) for terminals and piers.

11.9.105 There is only one area of airport infrastructure where flood depths are modelled to increase; located at the north-west edge of the proposed fire training ground. For most of the area the increase in flood risk would be less than 50 mm (low adverse impact).

11.9.106 For grassed parts of the airport, there are extended areas where flood depths decrease and some smaller areas of localised increases, including the proposed flood compensation areas. Overall, considering the area at whole, the significance of effect on grassed areas of the airport is considered to be **negligible adverse** (not significant). Table 11.9.2 summarises the effects on airport infrastructure.

Table 11.9.2: Summary of Fluvial Flood Risk Effects on Airport Infrastructure

Receptor	Sensitivity	Magnitude	Effect	Significant/not significant
Runways and taxiways	Very high	Medium	**Major beneficial**	Significant
Terminals and piers	Very high	Low	**Moderate/major beneficial**	Significant
Stands	Very high	No change	**No change**	Not significant
Fire training Ground	Medium	Low	**Minor adverse**	Not significant
Car parking	Medium	Medium	**Moderate beneficial**	Significant
Grassed areas	Low	Negligible	**Negligible/minor adverse**	Not significant

Reservoir Flooding

11.9.107 A number of airport infrastructure elements currently fall within reservoir failure flow paths (see Figure 11.6.6). However, as large reservoirs, these structures are maintained and operated in accordance with the Reservoirs Act (1975) and therefore the risk of failure is considered very low. The Project proposes to make best use of existing infrastructure and therefore, no new reservoir failure flow paths are introduced to the study area. Overall, the effect is considered to be **no change**.

Groundwater Flooding

11.9.108 Foundation and/or box structures intercepting and/or diverting groundwater flows could result in an increase of flood risk elsewhere. Any such increase would be expected to have a negligible impact (ie <10 mm increase in flood depths) and would occur in low-lying areas that are already susceptible to groundwater flooding. The effect on airport infrastructure of very high sensitivity would therefore be **minor adverse,** and **negligible/minor adverse** on airfield grassed areas of low sensitivity.

Sewer/Water Supply Flooding

11.9.109 During the operational phase of the Project, peak daily passenger numbers would increase, introducing additional loading to the foul sewerage system of the airport. This could have a potential long-term impact on sewer flood risk. However, modelling of this increase has shown that the sewerage system would not be significantly affected by the Project. The foul sewerage system (with mitigation) would have adequate capacity to accommodate the increase in flows from surface water runoff expected to be caused by the Project. The impact on all potential receptors (very high to low sensitivity) would therefore be negligible, resulting in an effect of **negligible/minor adverse** significance.

11.9.110 Additional water supply infrastructure would also have to be installed as part of the Project, in order to accommodate new buildings and infrastructure. However, this would be new infrastructure and would be considered to be at low risk of failing and causing flooding (negligible impact). In the case that parts of the existing water supply network are replaced as part of the Project, this could provide an overall betterment in terms of flood risk. Overall, the effect on all potential receptors (very high to low sensitivity) would be considered **negligible/minor beneficial**.

Water Infrastructure – Wastewater

11.9.111 2038 would see peak daily passenger numbers increase by approximately 21 per cent compared to the 2038 future baseline. Compared to the future baseline for 2038, the Project foul system flows are a maximum of 11 per cent higher for the dry weather cases, but 6 per cent lower for the wet weather cases due to the proposed mitigation works and changes in land use associated with the Project which would divert storm flow out of the foul system. Hydraulic modelling has been undertaken to determine the impact of the additional flows in the GAL wastewater network infrastructure (medium sensitivity), taking account of the proposed mitigation measures to be implemented as part of the Project. The modelling results show that the proposed infrastructure is of sufficient capacity for the projected flows, so it is considered that the impact is negligible, resulting in a **negligible/minor adverse** effect (not significant). The assessment of effects on the Thames Water network and wastewater treatment works is ongoing and will be updated in the ES.

Water Infrastructure – Water Supply

11.9.112 There is anticipated to be an increase in demand on the water supply due to the forecast increase in passenger numbers during 2038. Calculations have been undertaken to determine the extent of the increase and, through discussions with GAL and SESW, the impact on the upstream water infrastructure is considered to be low adverse, resulting in a **negligible/minor adverse** effect (not significant). Through consultation, SESW has provisionally stated that their sources and network

can meet the additional demands of the Project during operation (subject to the full findings of their impact assessment).

Further Mitigation

11.9.113 It is considered that additional mitigation would be required to address the long-term effects on flood risk. The details of the further mitigation will be refined for the ES, however it is likely to include the measures set out below.

Flood Risk and Surface Water Drainage

11.9.114 Whilst from an EIA perspective the level of significance is minor (adverse) or better for all effects related to flood risk, further mitigation may be put in place in order to mitigate any residual risk of increase in downstream surface water flooding to ensure compliance with the NPS. A more detailed assessment is included in the FRA (Appendix 11.9.1). It is anticipated that further mitigation may be provided during the detailed design of the proposed drainage strategy for Gatwick and after the surface water drainage hydraulic model has been verified. This would likely take the form of oversized pipes or, where required, additional attenuation capacity for the proposed surface water attenuation facilities (eg car park Y).

Future Monitoring

11.9.115 From a geomorphological and Water Environment Regulations perspective, regular monitoring of any change to the channel bed and banks should be undertaken, particularly in the vicinity of the River Mole channel diversion, following completion of the Project. This should be undertaken using fixed point photography. If negative change occurs, appropriate mitigation should be implemented.

11.9.116 Any impacts to water quality would be identified by existing discharge monitoring undertaken by GAL (at Pond A, M and D and in the River Mole) and by Thames Water (at Crawley sewage treatment works).

11.9.117 Water demand can be further refined and updated through continuous monitoring of water consumption data and changes in passenger numbers.

11.9.118 No additional monitoring is required for other water disciplines.

Significance of Effects

11.9.119 Any effect regardless of severity could be considered significant to third parties according to the NPS. Therefore, the further mitigation measures proposed for potential residual surface water flood risk impacts would aim to ensure that no third parties are impacted by the Project. These would ensure that the Project would not increase flood risk elsewhere, and therefore the significance of the effects to third parties would be reduced to **negligible**.

11.9.120 The potential impacts on geomorphology mainly arise due to the flood risk mitigation associated with the River Mole channel diversion, creation of flood compensation areas and extension of culverts. There would be a minor to negligible effect on the watercourses with the implementation of the design recommendations proposed. The overall the long-term effect on the River Mole would be **minor beneficial**, whilst there would be a **minor adverse** effect on Gatwick Stream, Crawter's Brook and Burstow Stream. The significance of the effect on Burstow Stream Tributary would be **negligible**. Other remaining impacts on the watercourses associated to the Project,

such as new access arrangements, would be offset by improvements and environmental enhancement in other areas of the catchment, as part of the embedded mitigation. Therefore, any residual effect with a significance of minor or less is not considered to be significant.

11.9.121 Based on a qualitative assessment of groundwater flood risk, it is considered that some elements of the Project may have a local impact on groundwater flow paths and levels in their immediate vicinity. These risks would easily be addressed by adopting appropriate design practices during the detailed design stage and therefore, it is considered that the residual risk from groundwater flooding will not be adversely affected by the Project. This is therefore not anticipated to change the assessment of effect.

11.10 Potential Changes to the Assessment as a Result of Climate Change

11.10.1 The impact of climate change is an integral part of the assessment for the water environment. Impacts such as increased severity and frequency of droughts and floods, changes to rainfall patterns in terms of rainfall intensity, and seasonal and annual rainfall totals, are relevant to the assessment of different water environment elements. Other aspects such as changes related to cold weather events impact on airport de-icing operations. As these climate change impacts are taken into account in the assessment, there is no anticipated change to the assessment as a result of climate change. A summary of the main climate change considerations incorporated into the assessment for each water environment element is given below.

Geomorphology

11.10.2 Climate change could potentially alter the hydrological regime of the watercourses over a medium to long-term time period. Increased frequency or severity of droughts and floods could potentially lead to the watercourses adjusting to different patterns of erosion and deposition. It is likely that the adjustment would remain localised and of relatively low magnitude given the channel types. Overall, the potential effect of climate change is unlikely to change the outcome of this assessment.

Water Environment Regulations

11.10.3 From a Water Environment Regulations perspective, climate change could impact on habitats due to an altered hydrological regime related to both floods and droughts, impacting on potential changes in species preference. Although the exact changes are difficult to predict overall, there will be no significant effect as the water bodies respond to changes and attempt to reach a new equilibrium. Therefore, the potential effect of climate change is not anticipated to change the outcome of the assessment.

Water Quality

11.10.4 Climate change impacts on water quality aspects related to geomorphology and Water Environment Regulations are not anticipated to alter the assessment, as noted above. However, the impact of climate change and weather variability on de-icer use is challenging to predict. The latest projections of future climate change (UKCP18) indicate that winters will become wetter and warmer on average which would generally reduce de-icer use. However, for a given weather event (such as the winter 2017/18 event used for the assessment) with increased air traffic movements, de-icer use would be greater. It is important to note that whilst winters are anticipated to become warmer on average, cold weather spells will still occur. This has been

taken into account in the assessment, and therefore, no further change to the assessment is expected as a result of climate change.

Groundwater

11.10.5 Although impacts of climate change on groundwater are uncertain, the consensus of climate change predictions (UK Groundwater Forum, 2019) appears to suggest that changes in rainfall patterns are likely to lead to overall reductions in groundwater recharge. Conversely, other extremes, such as groundwater flooding, may also occur. The impact of potentially drier summers (increasing soil moisture deficit and reducing groundwater storage) may not be compensated for by wetter winters or higher intensity storms as these tend to generate rapid runoff instead of steady infiltration to groundwater. Changes in groundwater recharge have been taken into account in the assessment, and therefore no changes to the assessment are anticipated.

Flood Risk and Surface Water Drainage

11.10.6 The impact of climate change on flood risk will be to increase the risk of both fluvial flooding and surface water flooding. However, this has been considered as an integral part of the assessment as a worst-case scenario and in line with Environment Agency guidance (Environment Agency, 2016a). In July 2021 the Environment Agency updated their guidance for the consideration of the future impacts of climate change on peak river flow to reflect UKCP18 data. This assessment has not incorporated the updated allowances. The new allowances will be adopted to inform the ES. However an initial review indicated that the requirements have reduced and therefore the current mitigation strategy is expected to continue to meet planning policy requirements, which would be confirmed via an updated FRA that would inform the ES. As climate change has been fully integrated to the assessment, no changes to the assessment are anticipated.

Wastewater

11.10.7 Climate change has the potential to cause rainfall of increased depth, frequency and intensity to occur compared to the present rainfall patterns. As a result, storm runoff from the small contributing areas discharging to the foul sewerage system would increase the flows in the network and potentially exceed the capacity of the gravity sewers or pumping stations. The potential impact was tested using the Design Year 2038 case as this exhibits the highest normal flows in the system. The Environment Agency predicts an upper end potential increase in precipitation of 20 per cent for the year 2039 and the storm flows were increased by this percentage and the performance of the system was compared to the equivalent baseline, and also the absolute impact was assessed. The climate change increase to the storm flows increases the peak flows in the foul sewerage system by approximately 10 per cent: as a result, there are some minor increases to surcharging of the gravity pipes, and the pumps have to run for longer in order to deal with the flow, but there is no predicted flooding or significant detriment to the operation of the network. Compared to the incremental baseline with the same rainfall uplift applied, the total flows are 7 per cent lower and the predicted stress on the network is considerably less due to the proposed mitigation works and changes in land use associated with the Project which will divert storm flow out of the foul system. The impact on the foul sewerage system would be minor adverse as there is no predicted risk of flooding, but the system will experience higher degrees of surcharge. As these factors are taken into account on the assessment process, no additional changes to the assessment are anticipated as a result of climate change.

Water Supply

11.10.8 Climate change may have an impact on available water sources due to changes in annual rainfall which affect impounding reservoir catchment areas, or groundwater available for abstraction. This is not currently deemed to have a significant effect on the water source, but this should be reviewed as the Project develops. Overall, the potential effect of climate change is unlikely to change the outcome of this assessment.

11.11 Cumulative Effects

Zone of Influence

11.11.1 The zone of influence (ZoI) for the water environment has been identified based on the spatial extent of likely effects.

Screening of Other Developments and Plans

11.11.2 The Cumulative Effect Assessment (CEA) takes into account the impact associated with the Project together with other developments and plans. The projects and plans selected as relevant to the CEA presented within this chapter are based upon the results of a screening exercise undertaken as part of the 'CEA short list' of developments. Each development on the CEA long list has been considered on a case by case basis for scoping in or out of this chapter's assessment based upon data confidence, effect-receptor pathways and the spatial/temporal scales involved.

11.11.3 In undertaking the CEA for the Project, it is important to bear in mind that the likelihood of other developments and plans being constructed varies depending on how far along the planning process they are. For example, relevant developments and plans that are already under construction are likely to contribute to a cumulative impact with the Project (providing impact or spatial pathways exist), whereas developments and plans not yet approved or not yet submitted are less certain to contribute to such an impact, as some may not achieve approval or may not ultimately be built due to other factors. For this reason, all relevant development and plans considered cumulatively alongside the Project have been allocated into 'Tiers', reflecting their current stage within the planning and development process. Appropriate weight is therefore given to each Tier in the decision-making process when considering the potential cumulative impact associated with the Project (eg it may be considered that greater weight can be placed on the Tier 1 assessment relative to Tier 2). Further details of the screening process for the inclusion of other developments and plans in the short list and a description of the Tiers is provided in Chapter 19: Cumulative Effects and Inter-relationships.

11.11.4 The specific developments scoped into the CEA for the water environment and the tiers into which they have been allocated, are outlined in Table 11.11.1. The developments included as operational in this assessment have been commissioned since the baseline studies for this Project were undertaken and as such were excluded from the baseline assessment.

11.11.5 The assumption of the Project and this assessment is that the developments in Table 11.11.1 would comply with national planning policy and would therefore include mitigation not to increase flood risk off site nor detrimentally effect the water environment.

Table 11.11.1: List of Other Developments and Plans considered within CEA

Reference Number	Application Number	Description	Distance from Project (km)	Overlap with the Project?
Tier 1				
2	CR/2016/0858/ARM	Forge Wood. Application for approval for reserved matters for Phase 3 Employment Building, car parking, internal access roads, footpaths, parking and circulation areas, hard and soft landscaping and other associated infrastructure and engineering works.	1.6	Only an impact if no mitigation included – not anticipated
3	CR/2016/0083/ARM	Forge Wood. Application for approval of reserved matters for Phase 2c for the erection of 249 dwellings, car parking including garages, internal access roads, footpaths, parking and circulation area, hard and soft landscaping and other associated infrastructure and engineering works.	2.1	Only an impact if no mitigation included – not anticipated
9	CR/2016/0962/ARM	Forge Wood. Application for approval of reserved matters for Phase 3b for 151 dwellings and associated works.	2.2	Only an impact if no mitigation included – not anticipated
15	CR/2016/0114/ARM	Forge Wood. Approval of reserved matters for Phase 2d for the erection of 75 dwellings, car parking including garages, internal access roads, footpaths, parking and circulation area, hard and soft landscaping and other associated infrastructure and engineering works and noise.	2.1	Only an impact if no mitigation included – not anticipated
17	CR/2016/0780/ARM	Forge Wood. Application for approval of reserved matters for Phase 3a for 225 dwellings and associated works.	2.2	Only an impact if no mitigation included – not anticipated
46	CR/2018/0544/OUT	Application for up to 150 residential units; new site access from Birch Lea with enhanced access from Kenmara Court, demolition of the existing Oakwood Football Club.	2.1	Only an impact if no mitigation included – not anticipated
48	CR/2017/0810/FUL	Application for the temporary use (for a period of 5 years) of the site as a Park and Ride car park, comprising 892 car parking	1.2	Only an impact if no mitigation

Reference Number	Application Number	Description	Distance from Project (km)	Overlap with the Project?
		spaces (814 long stay) and associated infrastructure.		included – not anticipated
155	CR/2018/0894/OUT	Outline Application for up to 185 residential dwellings with associated vehicle and pedestrian access via steers lane, car parking, cycle storage and landscaping.	1.3	Only an impact if no mitigation included – not anticipated
158	CR/2016/0997/FUL	Demolition of 3 existing office buildings and erection of a new b1(a) office building.	2.0	Only an impact if no mitigation included – not anticipated
159	CR/2012/0134/OUT	Outline application for erection of a mixed use employment park to include use classes b1c, b2, b8 and a business hub accommodating a mix of uses, including b1a, b1c, b8, c1, a1, a3, a5 and car dealerships.	2.4	Only an impact if no mitigation included – not anticipated
162	CR/2017/0997/OUT	Hybrid application for construction of a new town hall and offices, associated car parking, 182 residential units and commercial space.	3.3	Only an impact if no mitigation included – not anticipated
52	04/02120/OUT	Comprehensive mixed use development to comprise housing (approx. 1510 dwellings), neighbourhood centre, primary school, recreation and open space uses, plus associated infrastructure and access roads linking the development to A23 and A217.	5.0	No – sufficiently downstream not to impact
64	2019/548/EIA	Request for screening opinion for the Proposed Development of circa 360 residential units and a small amount of commercial development.	1.5	Only an impact if no mitigation included – not anticipated
73	DC/17/2481	Outline planning application for the development of approximately 227 dwellings with the construction of a new access from Calvert Link, a pumping station and associated amenity space.	6.3	Only an impact if no mitigation included – not anticipated
81	13/04127/OUTES	Outline planning application for up to 500 homes, a primary school and doctors surgery, up to 15,500 sqm employment floorspace, public open space, allotments,	2.7	Only an impact if no mitigation included – not anticipated

Reference Number	Application Number	Description	Distance from Project (km)	Overlap with the Project?
		associated landscaping, infrastructure and pedestrian and cycle access.		
103	CR/2015/0552/NCC (and subsequent reserved matters and non-material amendment applications)	Allocated in Crawley Local Plan 2030 (Adopted) known as Forge Wood. Erection of up to 1900 dwellings, 5000 sqm of use class b1,b2 & b8 employment floorspace, 2500 sqm of retail floorspace, a local centre/community centre (including a community hall), a new primary school, recreational open space, landscaping, the relocation of the 132 Kv ohv power line adjacent to the m23, infrastructure and means of access. CR/1998/0039/OUT permitted through appeal on 16/02/2011. A variation of condition application, CR/2015/0552/NCC, was approved in 2016 and did not change the quantum of development, the proposed land uses or for the most part the general disposition of those land uses within the site. There have since been a number of reserved matters applications for the phased stages of development (1A,1C,2A,3A) and non-material amendments made.	1.6	Only an impact if no mitigation included – not anticipated
281	CR/2019/0542/FUL	Demolition of existing nightclub and redevelopment of site providing 152 apartments, ground floor commercial/retail space (class A1, A3, A4, B1 and/or D2 uses) split between 2 to 4 units, new publicly accessible public realm (including pocket park), new publicly accessible electric vehicle charging hub, car club and associated works	4	Only an impact if no mitigation included – not anticipated
283	CR/2015/0718/ARM	Allocation within Crawley Local Plan 2021-2037 (Regulation 19). Approval of Reserved Matters for Phase 2B for 169 dwellings and associated works pursuant to outline permission CR/2015/0552/NCC for a new mixed-use neighbourhood	1.6	Only an impact if no mitigation included – not anticipated

Reference Number	Application Number	Description	Distance from Project (km)	Overlap with the Project?
289	20/02515/SCREEN	Screening opinion for erection of a crematorium together with associated access, parking and landscaping. Screened as not EIA.	7.2	Only an impact if no mitigation included – not anticipated
292	20/02017/S73	Part demolition of existing building, conversion of upper floors of existing building to residential with additional floor, connected 5 storey new build residential building to provide total 43 apartments.	1.5	Only an impact if no mitigation included – not anticipated
149	DC/10/1612	Housing/Mixed Development site allocated in the Horsham DC Planning Framework (Adopted 2015). Outline approval for the development of approximately 2500 dwellings, new access from A264 and a secondary access from A264, neighbourhood centre, comprising retail, community building with library facility, public house, primary care centre and care home, main pumping station, land for primary school and nursery, land for employment uses, new rail station, energy centre and associated amenity space. To be constructed in phases of which most are built out.	6.7	Only an impact if no mitigation included – not anticipated
328	EIA/20/0004	EIA Scoping for West of Ifield - allocated site. The proposed development is on a site of 194 hectares in size with a minimum of 3,250 homes and up to 4,000 homes along with social infrastructure, green infrastructure and highway links.	1.5	Only an impact if no mitigation included – not anticipated
334	13/04127/OUTES	Outline planning application for up to 500 homes, a primary school and doctors surgery, up to 15,500 sqm employment floorspace (B1c light industry/B8 storage and distribution), public open space, allotments, associated landscaping, infrastructure (including substations and pumping station) and pedestrian and cycle access	2.7	Only an impact if no mitigation included – not anticipated
341	DM/20/4127	Outline application for an expansion of the existing commercial estate with up to 7,310	7.3	Only an impact if no mitigation

Reference Number	Application Number	Description	Distance from Project (km)	Overlap with the Project?
		sqm of new commercial space. There is currently 3,243 sqm of existing commercial space, of which 2,530 sqm will be retained and 713 sqm of lower-quality, temporary buildings and portacabins removed.		included – not anticipated
387	CR/2018/0273/FUL	Gatwick Station. Proposed construction of new station concourse/airport entrance area, link bridges, platform canopies, back of house staff accommodation and associated improvement works.	0	Only an impact if no mitigation included – not anticipated
Tier 2				
328	EIA/20/0004	EIA Scoping for West of Ifield - allocated site. EIA Scoping for West of Ifield - allocated site. The proposed development is on a site of 194 hectares in size with a minimum of 3,250 homes and up to 4,000 homes along with social infrastructure, green infrastructure and highway links.	1.5	Only an impact if no mitigation included – not anticipated
385	TR020003 (PINS Reference)	Expansion of Heathrow Airport to enable at least 740,000 air traffic movements per annum and including a new runway to the north-west of the existing airport; supporting airfield, terminal and transport infrastructure; works to the M25, local roads and rivers; temporary construction works, mitigation works and other associated development.	40	No hydraulic connection
Tier 3				
112	Tinsley Lane	Key Housing Site Allocation for 120 dwellings and community uses under Local Plan. Outline application CR/2018/0544/OUT for 150 units and community uses submitted in July 2018 appears to have been undetermined or withdrawn.	2.2	Only an impact if no mitigation included – not anticipated
133	Land west of Balcombe Road, Horley Strategic	Horely Employment Park - Strategic Employment Site - 83ha with 200,000 sqm office space.	0.4	Only an impact if no mitigation included – not anticipated

Reference Number	Application Number	Description	Distance from Project (km)	Overlap with the Project?
	Business Park			
134	Land off the Close and Haroldslea Drive	Residential allocation, up to 40 new homes, 2.4 hectare site.	1.2	Only an impact if no mitigation included – not anticipated
152	Land north of Rosemary Lane	Identified for a potential ca. 150 housing units, 5.12 hectare site.	1.4	Only an impact if no mitigation included – not anticipated
153	Land east of Ifield Road	Identified for a potential ca. 150 housing units, 9 hectare site with 5 hectares developable.	1.4	Only an impact if no mitigation included – not anticipated
356	Land adjacent to Desmond Anderson	Housing allocation for 150 dwellings	6.6	Only an impact if no mitigation included – not anticipated
357	Land to the southeast of Heathy Farm, Balcombe Road	Housing allocation for 150 dwellings	4.1	Only an impact if no mitigation included – not anticipated
359	Telford Place/ Haslett Avenue	Town Centre Key Opportunity Site - Housing allocation for 300 dwellings	5	Only an impact if no mitigation included – not anticipated
361	Crawley College	Town Centre Key Opportunity Site - Housing allocation for 400 dwellings	4.7	Only an impact if no mitigation included – not anticipated
368	Land east of Balcombe Road and South of the M23 Spur - 'Gatwick Green'	Allocated for an industrial-led Strategic Employment Location that will provide as a minimum 24.1 hectare new industrial land, predominantly for B8 storage and distribution use	2.5	Only an impact if no mitigation included – not anticipated

Reference Number	Application Number	Description	Distance from Project (km)	Overlap with the Project?
145	Land at Plough Road and Redehall Road, Smallfield	160 residential units, 5 hectare site under Proposed Plan	3.6	No – of sufficient distance not to interact
146	Land North of Plough Road, Smallfield	120 residential units, 9.2 hectare site under Proposed Plan	4.0	No – of sufficient distance not to interact
264	Land West of Reigate Road, Hookwood Site Allocation Policy SA42	Site identified in the Reg 18 consultation draft local plan (Feb 2020 to March 2020) for 450 dwellings and two gypsy and travellers pitches	0.3	Only an impact if no mitigation included – not anticipated
386	Gatwick Airport Sewage Treatment Works	Land within the airport available for extension to the Crawley Sewage Treatment Works if required.	0	Only an impact if no mitigation included – not anticipated

Cumulative Effects Assessment

11.11.6 A description of the significance of cumulative effects upon the water environment arising from each identified impact is given below.

Flood Risk, Surface Water Drainage, Geomorphology, Water Environment Regulations, Water Quality, Groundwater

11.11.7 It is assumed that approved developments within the ZoI would include embedded and further mitigation of any effects and residual effects respectively, in order to ensure there is no deleterious impact upon the water environment. The assessment undertaken in this chapter showcases that there will be no residual significant adverse effects to flood risk and surface water drainage, geomorphology, Water Environment Regulations, groundwater or water quality from the Project to third parties. Therefore, no cumulative effects are anticipated among the Project and other developments within the ZoI for all assessment years.

Water Infrastructure

11.11.8 With respect to the private Gatwick wastewater network, there are no cumulative effects, but there could be an impact on the public sewerage and treatment facilities. These are expected to

be taken into account by Thames Water when they perform their forthcoming Development Impact Assessment (see paragraph 11.9.2).

11.11.9 In terms of water supply all of the items listed may have an impact on water supply, as all will increase demand in the surrounding area. Any hydraulic impact assessments will be carried out by SESW and it is recommended that regular contact be established during development of the Project programme with respect to any changes to levels of service.

11.12 Inter-Related Effects

11.12.1 The mitigation measures proposed as part of this assessment are embedded within the Project and any potential inter-related impacts with other topics would be assessed as part of this PEIR. One such risk is floodwater entering the wastewater sewerage system. If it did, then pumping stations could get inundated and flood themselves, adding to any water quality impact from the original flooding itself. Although the likelihood of this occurring in the baseline would be low, as the available pathways into the foul system are generally limited and it would be reduced further by the Project via the provision of new drainage infrastructure, it would still be considered.

11.12.2 Further mitigation proposed as part of other topics could potentially encroach on floodplain or interrupt existing surface water flow paths. At this stage, the specific location and arrangements of such mitigation measures have not been determined and potential inter-related effects cannot be assessed. These will be considered and, if necessary, mitigated during future design stages.

11.12.3 Water quality impacts of the Project could affect aquatic ecology receptors. This would be considered in the ES following completion of the surface water drainage hydraulic model. Although it is anticipated that the Project would include sufficient mitigation to ensure no significant impacts as a result of increased de-icer use.

11.12.4 There is an opportunity for use of the proposed flood compensation areas for other environmental mitigation and/ or recreational purposes, compatible with their currently proposed use. This should be considered during the final ES assessment and detailed design stages.

11.13 Summary

11.13.1 An assessment has been undertaken to identify the likely effects of the Project on the water environment comprising:

- flood risk and surface water drainage;
- geomorphology;
- Water Environment Regulations;
- water quality;
- groundwater resources;
- wastewater infrastructure; and
- water supply infrastructure.

11.13.2 The primary effects of the Project on the water environment, without the consideration of further mitigation, are related to flooding, surface water drainage, geomorphology and water quality. However, there are potential effects on all water environment elements.

11.13.3 For flood risk, the assessment covers all sources of flood risk to the Project, the likely effects of the Project on flood risk and the measures which are proposed as part of the Project to mitigate any potential effects.

11.13.4 The following conclusions can be made with regards to flood risk to the Project site:

- Fluvial flooding is the principal source of flood risk to the Project. Elements proposed as part of the Project, including new taxiways and stands, would be located as close to existing infrastructure as possible. Therefore, levels of fluvial flood risk to proposed airport infrastructure would be equivalent to existing or reduced.
- Surface water flooding is also a significant source of flooding to the Project. However, in most cases surface water flow paths and ponding areas are small in extent and do not encroach on proposed elements of the Project. Where they do, surface water drainage will mitigate any risk.
- At this stage, it has not been possible to fully quantify groundwater flood risk to the Project site; however, it is considered that the risk from groundwater flooding at the airport site is low.
- The risk of flooding from other sources, including reservoirs and sewers flooding, is considered low.

11.13.5 Hydraulic modelling results showed that the development of the Project would increase the risk of flooding if no mitigation was in place. Therefore, flood mitigation measures have been proposed and are embedded in the Project, such that the Project will remain safe for its lifetime without increasing flood risk elsewhere.

11.13.6 At this stage, the assessment of Project impacts on surface water flood extents is generally qualitative. A more detailed assessment will be undertaken once the Gatwick surface water model is validated for the ES. However, it has been shown that the Project would not significantly increase discharge volumes and peak runoff rates to third parties.

11.13.7 Any groundwater flood risk that could occur due to the Project would be addressed by adopting appropriate design practices. Overall, it is considered that the risk from groundwater flooding would not be adversely affected by the Project and risk from groundwater flooding would remain low.

11.13.8 Overall, the significance of flood risk effects from the Project on all sources of flood risk has been assessed to be (at worst) negligible or minor adverse and therefore not significant in terms of the EIA Regulations, assuming the appropriate embedded mitigation measures outlined above are implemented during the construction and operational phases. The development would therefore be safe for its users and would not increase flood risk elsewhere. For certain receptors, the Project improves fluvial flood risk for third parties.

11.13.9 For geomorphology, the assessment evaluates the potential impacts of the Project and the embedded flood mitigation measures on the geomorphology of watercourses in the study area, during the construction and operational phases of the Project. The assessment found that during the initial construction phase of the Project, there would be minor adverse impacts on the River Mole associated to construction of the channel diversion and creation of flood compensation areas which are part of the embedded flood mitigation. The effects would be temporary, however, and the channel diversion works would deliver an overall improvement to the geomorphology of the watercourse, supporting Water Environment Regulations objectives during operation. There

would be negligible to minor adverse impacts during construction works with the provision of mitigation and best practice measures through the CoCP. During the first full year of operation, there would be a negligible to minor adverse impact on the watercourses as they adapt and adjust to associated construction works, including the new surface access arrangements at the South Terminal and North Terminal. During the interim assessment year of the Project, there would be minor adverse impacts on the watercourses associated to construction of the Gatwick Stream flood compensation area, with the provision of mitigation and best practice measures through the CoCP. During the design year, there would be minor to negligible adverse impacts associated to operational activities on the watercourses. These relate to the River Mole channel diversion, flood compensation areas and culvert extensions. There would be a moderate beneficial impact on the River Mole with the implementation of the mitigation proposed and further detailed design work. Other remaining impacts on the watercourses associated to the Project, such as new access arrangements, would be offset by improvements and environmental enhancement in other areas of the catchment, as part of the embedded mitigation.

11.13.10 Within the catchment there are several water bodies assessed in the Water Environment Regulations compliance assessment, including both surface water and groundwater features, many of which are of high importance. These could be potentially impacted by construction works, but through appropriate design and mitigation, the impact would not be significant. Following completion of construction, during operation, it is anticipated that there are benefits overall.

11.13.11 The diversion of the River Mole has been assessed to have a minor adverse effect on water quality. This would be short-term during construction, and the longer term effect is beneficial due to the naturalisation of the watercourse.

11.13.12 With regard to water quality, at this preliminary stage, the future de-icing strategy has not yet been developed. A precautionary approach has been taken assuming that de-icer load increases proportionally with the increase in air traffic movements and increase in airfield pavement area. The Project provides infrastructure to fully retain or treat this additional load and the assessment concludes that any impact on the water environment is negligible.

11.13.13 For groundwater, the hydrogeology of the area shows that the underlying strata are largely either secondary aquifers or unproductive strata. Potential impacts in construction and operation include the risk of pollution, diversion of groundwater flow, the introduction of new flow pathways, and alterations to recharge. All of the impacts identified can be mitigated to an acceptable level through good practices as embedded mitigation.

11.13.14 The impacts on the private airport wastewater system will be negligible, as upgrading works to accommodate the forecast increased inflows are to be constructed as part of the Project. Any impacts on the public sewerage conveyance and treatment facilities will be addressed by Thames Water in their forthcoming Development Impact Analysis and appropriate mitigation works will be provided if and as required.

11.13.15 For water supply the assessment shows that water demand will increase due to increase in passenger numbers through the existing site, during construction, and following completion of the terminal improvements and additional hotel and commercial facilities. This can be partially mitigated through introduction of water efficiencies during construction of new facilities. Following conversations with SESW it has been provisionally stated that forecast demands are unlikely to negatively impact the water source.

11.13.16 From the assessment undertaken of the potential impacts on all elements of the water environment, suitable mitigation has been proposed and it is concluded that there are no significant residual effects.

Next Steps

11.13.17 This PEIR Chapter has presented a preliminary assessment of the likely effects of the Project on the water environment. The assessment at the final ES stage will develop key subjects discussed within this chapter with further quantitative and qualitative detail and supported by more site-specific information and design detail.

11.13.18 The design of the highways improvement elements of the Project will be progressed further, and the assessment of impact will be updated to inform the ES.

11.13.19 Further development of a detailed surface water flood model and a combined surface water and fluvial model will be undertaken. This will allow for further quantitative assessment of impact on flood risk and water quality to be undertaken when the model is validated.

11.13.20 In terms of geomorphology, further information from comparison of changes in river energy and sediment transport would provide quantitative detail on the downstream impacts of the embedded flood mitigation.

11.13.21 In terms of Water Environment Regulations, further information from ecological surveys is required in order to fully complete the assessment. This should include fish, conclusions from the Habitats Regulations Non Significant Effects Report, macrophytes and invertebrates. Ground investigations, including aquifer depth will inform the ES. Finally, further information on the highway drainage design will be provided in order to support the conclusions in the assessment that there will be betterment.

11.13.22 In terms of groundwater flooding, the effects to and arising from the Project would be assessed in more detail once site-specific surveys and investigation provide information on the exact ground conditions, such as the extent of superficial deposits and thickness of the Weald Clay Formation and groundwater levels at the areas where works are proposed as part of the Project, including the Museum Field and Gatwick Stream flood compensation areas, which would inform the ES.

11.13.23 In terms of groundwater, further assessment of the potential effects of infiltration from the surface water drainage and unlined attenuation ponds will be undertaken to inform the final ES assessment.

11.13.24 In terms of water supply SESW have provisionally stated that current water sources are sufficient to maintain supply to Gatwick even with forecast increases and proposed external development. Further changes to demand forecasts through design refinement and/or change should be communicated to SESW for re-evaluation.

11.13.25 Overall, the information included in this chapter provides the basis for the production of the relevant ES chapter. However, aspects of the highways improvements will be further developed or refined and will be incorporated into the final ES assessment.

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Table 11.13.1: Summary of Effects

Receptor	Receptor Sensitivity	Description of Impact	Short / Medium / Long Term / Permanent	Magnitude of Impact	Significance of Effect	Significant / Not significant	Notes
Initial Construction Phase: 2024-2029							
Surface Water	High to Low	Impacts the River Mole, Gatwick Stream, Crawter's Brook, Burstow Stream, Burstow Stream tributary and surface water drainage ponds include: ▪ Destabilisation of banks due to vegetation clearance and bank top loading ▪ Disruption to quantity and dynamics of flow and sediment supply due to changes to bed and bank form ▪ Increase to suspended sediment loads due to channel disturbance and runoff from construction areas	Medium-term	Negligible Adverse	Negligible – Burstow Stream Tributary, Minor Adverse other watercourses	Not significant	

Receptor	Receptor Sensitivity	Description of Impact	Short / Medium / Long Term / Permanent	Magnitude of Impact	Significance of Effect	Significant / Not significant	Notes
Surface Water – River Mole Geomorphology and Water Quality	High	River Mole diversion geomorphology	Medium-term	Low Adverse	Minor Adverse	Not significant	
Surface Water – River Mole Geomorphology and Water Quality	High	Construction of culvert extension and re-provisioning of siphon north of runway could affect quantity and dynamics of flow and increase suspended sediment	Medium-term	Negligible Adverse	Minor Adverse	Not significant	
Surface Water – River Mole Geomorphology and Water Quality	High	Museum Field, East of Museum Field and car park X flood compensation areas	Medium-term	Negligible to Low Adverse	Minor Adverse	Not significant	
Surface Water – Crawter's Brook Geomorphology and Water Quality	High	Car park X flood compensation areas	Medium-term	Negligible Adverse	Minor Adverse	Not significant	

Receptor	Receptor Sensitivity	Description of Impact	Short / Medium / Long Term / Permanent	Magnitude of Impact	Significance of Effect	Significant / Not significant	Notes
Surface Water – Water Quality (Water Environment Regulations)	High	River Mole diversion water quality	Short-term	Low Adverse	Minor Adverse	Not significant	Considered a short-term impact during works and in long-term would be beneficial
Groundwater (Secondary A aquifer)	Low to Medium	Groundwater levels and flow	Short-term	Low Adverse	Negligible/ Minor Adverse	Not significant	
Groundwater (Secondary A aquifer)	Low to Medium	Diversion of flow and mobilisation of contaminants	Short-term	Low Adverse	Negligible/ Minor Adverse	Not significant	
Groundwater (Secondary A aquifer)	Low to Medium	Spillage of contaminants at the surface	Medium-term	Low Adverse	Negligible/ Minor Adverse	Not significant	
Flood Risk - Fluvial	Very High to Low	Loss of floodplain	Medium-term	Negligible to Minor Beneficial	Negligible to Minor Beneficial	Not significant	Mitigation measures address Project effects and reduce baseline flood risk
Flood Risk - Groundwater	Very High to Low	Lowering of ground levels or impediment of groundwater flows	Medium-term	Negligible	Negligible to Minor Adverse	Not significant	

Receptor	Receptor Sensitivity	Description of Impact	Short / Medium / Long Term / Permanent	Magnitude of Impact	Significance of Effect	Significant / Not significant	Notes
Flood Risk- Surface Water	Very High to Low	Increased flood risk due to: ▪ alteration of surface water flow paths ▪ changes in groundwater levels ▪ changes in surface water discharge rates and volumes	Medium-term	Negligible	Negligible to Minor Adverse	Not significant	
Water Infrastructure – Wastewater	Medium	Increased discharges to wastewater network due to construction activities and increased passengers	Medium-term	Negligible	Negligible to Minor Adverse	Not significant	
Water Infrastructure – Water Supply	Low	Increased water consumption due to construction activities	Medium-term	Negligible	Negligible to Minor Adverse	Not significant	
First full year of operation: 2029 (to 2032)							
Surface Water – Water Quality, Geomorphology and Water Environment Regulations	High to Low	Ongoing impacts the River Mole, Gatwick Stream, Crawter's Brook, Burstow Stream, Burstow Stream tributary and surface water drainage ponds from construction	Medium-term	Negligible Adverse	Minor Adverse - Gatwick Stream, River Mole and Crawter's Brook,	Not significant	

Receptor	Receptor Sensitivity	Description of Impact	Short / Medium / Long Term / Permanent	Magnitude of Impact	Significance of Effect	Significant / Not significant	Notes
					Burstow Stream, Negligible – Burstow Stream tributary		
Surface Water – Gatwick Stream Geomorphology, Water Quality	High	North Terminal highways works	Short-term	Negligible Adverse	Minor Adverse	Not significant	
Surface Water – Burstow Stream, Burstow Stream Tributary Geomorphology	Medium to Low	South Terminal highways works	Short-term	Negligible Adverse	Minor Adverse	Not significant	
Surface Water – River Mole Geomorphology	High	Longbridge Roundabout new surface access arrangements construction works	Short-term	Negligible Adverse	Minor Adverse	Not significant	
Surface Water - Gatwick Stream	High	Works at South Terminal roundabout could affect Gatwick Stream biological	Short-term	Low Adverse	Minor Adverse	Not significant	

Receptor	Receptor Sensitivity	Description of Impact	Short / Medium / Long Term / Permanent	Magnitude of Impact	Significance of Effect	Significant / Not significant	Notes
		elements from suspended sediment					
Surface Water – Water Quality	Low	Relocation of Pond A	Short-term	Low	Minor Beneficial	Not significant	
Groundwater and Flood Risk				No additional significant effects beyond those in the initial construction phase			
Water Infrastructure - Wastewater	Medium	Increased demand on wastewater network due to passenger growth	Long-term	Negligible	Negligible	Not significant	
Water Infrastructure - Water Supply	Low	Increased demand due to ongoing construction works and passenger growth	Long-term	Negligible	Negligible to Minor Adverse	Not significant	
Interim Assessment Year: 2032 (to 2037)							
Surface Water – Water Quality, Geomorphology and Water Environment Regulations	High to Low	Ongoing impacts the River Mole, Gatwick Stream, Crawter's Brook, Burstow Stream, Burstow Stream tributary and surface water drainage ponds from construction	Medium-term	Negligible Adverse	Minor Adverse - Gatwick Stream, River Mole and Crawter's Brook, Burstow Stream	Not significant	

Receptor	Receptor Sensitivity	Description of Impact	Short / Medium / Long Term / Permanent	Magnitude of Impact	Significance of Effect	Significant / Not significant	Notes
					Negligible – Burstow Stream tributary		
Surface Water – Water quality, Geomorphology and Water Environment Regulations	High	Construction of Gatwick Stream flood compensation area introducing sediment and changing bed form	Medium-term	Low Adverse	Minor Adverse	Not significant	
Groundwater - Secondary A aquifer	Low	Below ground works, eg car park Y, Pier 7 etc resulting in dewatering	Short-term	Low	Negligible to Minor Adverse	Not significant	Localised impacts
Groundwater - Upper Tunbridge Wells Sand Aquifer	Medium	Excavation of Gatwick Stream flood compensation areas may penetrate top of aquifer	Short-term	Low	Minor Adverse	Not significant	
Flood Risk				No additional significant effects beyond those in the initial construction phase			
Water Infrastructure - Wastewater	Medium	Increased demand on wastewater network due to passenger growth	Long-term	Negligible	Negligible	Not significant	

Receptor	Receptor Sensitivity	Description of Impact	Short / Medium / Long Term / Permanent	Magnitude of Impact	Significance of Effect	Significant / Not significant	Notes
Water Infrastructure - Water Supply	Low	Increased demand due to ongoing construction works and passenger growth	Long-term	No Change	No Change	Not significant	
Design Year: 2038							
Surface Water – Water Quality	High	Increase deicer use, potentially discharging to River Mole and Gatwick Stream	Long-term	Negligible	Minor Adverse	Not significant	Quality of discharges controlled by existing consents
Surface Water - Water Quality and Geomorphology	High	River Mole diversion, including re-meandering and restoration of natural channel morphology, improved floodplain coupling	Long-term	Medium Beneficial	Moderate Beneficial	Significant	
Surface Water - Geomorphology	High	River Mole diversion: changes to channel velocity and sediment transport modifications	Long-term	Low Adverse	Minor Adverse	Not significant	Further Project design work required to ensure a suitable river type for the bed gradient of the realignment in order to maintain

Receptor	Receptor Sensitivity	Description of Impact	Short / Medium / Long Term / Permanent	Magnitude of Impact	Significance of Effect	Significant / Not significant	Notes
							sediment transport capability.
Surface Water - Geomorphology	High	Extension of River Mole culvert results in removal of natural bed and banks	Long-term	Negligible Adverse	Minor Adverse	Not significant	Short length of channel affected, offset by enhancements downstream
Surface Water - Geomorphology	High	Creation of flood compensation areas: Museum Field, east of Museum Field and Gatwick Stream resulting in loss of natural bank	Long-term	Negligible to Low Adverse	Minor Adverse	Not significant	Small length of bank affected
Surface Water - Geomorphology	High	Car park X flood compensation area reduction in channel-floodplain coupling, car park X outfall loss of natural bank	Long-term	Negligible Adverse	Minor Adverse	Not significant	Small area impacted and set back from watercourse
Surface Water – Geomorphology	Medium to Low	South Terminal new surface access arrangements loss of banks due to extension of existing	Long-term	Negligible Adverse	Minor Adverse – Burstow Stream,	Not significant	Small length of bank affected

Receptor	Receptor Sensitivity	Description of Impact	Short / Medium / Long Term / Permanent	Magnitude of Impact	Significance of Effect	Significant / Not significant	Notes
		culvert at Burstow Stream Tributary, and modifications/creation of outfall to connect attenuation ponds			Negligible – Burstow Stream tributary		
Surface Water – Geomorphology	High	North Terminal new surface access arrangements encroachment onto floodplain and loss of banks due to new outfall headwalls on River Mole and Gatwick Stream	Long-term	Negligible Adverse	Minor Adverse	Not significant	Small area impacted and set back from watercourse
Surface Water – Geomorphology	High	Longbridge Roundabout new surface access arrangements encroachment onto floodplain and loss of banks due to new outfall headwalls on River Mole	Long-term	Negligible Adverse	Minor Adverse	Not significant	Small area impacted
Surface Water – Water Quality	High	Impacts to biological and chemical elements of River Mole	Medium-term	Low Beneficial	Minor Beneficial	Not significant	

Receptor	Receptor Sensitivity	Description of Impact	Short / Medium / Long Term / Permanent	Magnitude of Impact	Significance of Effect	Significant / Not significant	Notes
Surface Water – Water Quality	High	Construction of South Terminal roundabout improving chemical elements of Gatwick Stream	Long-term	Low Beneficial	Minor Beneficial	Not significant	
Surface Water – Water Quality	Medium	Construction of North Terminal roundabout improving chemical elements of Gatwick Stream	Long-term	Low Beneficial	Minor Beneficial	Not significant	
Groundwater – Superficial Secondary A aquifer	Low	Change in recharge, groundwater flow and storage	Long-term	Low Adverse	Negligible to Minor Adverse	Not significant	
Groundwater - Upper Tunbridge Wells Sand Secondary A aquifer	Medium	Change in recharge, groundwater levels and flow	Long-term	Negligible	Negligible	Not significant	Potential for aquifer recharge via flood plain compensation area
Flood Risk - Surface Water (Offsite)	Very High to High	Increased flood risk due to increased impermeable area	Long-term	Negligible	Negligible to Minor Adverse	Not significant	Potential impact on flood risk is long-term, however, if the

Receptor	Receptor Sensitivity	Description of Impact	Short / Medium / Long Term / Permanent	Magnitude of Impact	Significance of Effect	Significant / Not significant	Notes
							risk is realised, the flooding would be a short-term event.
Flood Risk – Surface Water (on Airport)	Very High to Low	Increased surface runoff due to increased impermeable area	Long-term	Medium to No Change	Minor Beneficial to Minor Adverse	Not significant	Potential impact on flood risk is long-term, however, if the risk is realised, the flooding would be a short-term event.
Flood Risk – Fluvial (offsite)	Very High (Transport Infrastructure) to Medium (Industrial)	Change in flood risk due to encroachment into floodplain	Long-term	Medium to No Change	Major Beneficial to No Change	Significant (beneficial)	Potential impact on flood risk is long-term, however, if the risk is realised, the flooding would be a short-term event. Third party receptors would experience lower

Receptor	Receptor Sensitivity	Description of Impact	Short / Medium / Long Term / Permanent	Magnitude of Impact	Significance of Effect	Significant / Not significant	Notes
							flood depths for the design event.
Flood Risk – Fluvial (on Airport)	Very High to Low	Change in flood risk due to encroachment into floodplain	Long-term	Medium to No Change	Major Beneficial to Minor Adverse	Significant (beneficial)	Potential impact on flood risk is long-term, however, if the risk is realised, the flooding would be a short-term event. Small extent of increase at Fire training Ground
Flood Risk - Reservoir	Very High to Low	Increased exposure to flooding as a result of reservoir failure	Long-term	No Change	No Change	Not significant	Potential impact on flood risk is long-term, however, if the risk is realised, the flooding would be a short-term event.

Receptor	Receptor Sensitivity	Description of Impact	Short / Medium / Long Term / Permanent	Magnitude of Impact	Significance of Effect	Significant / Not significant	Notes
Flood Risk - Groundwater	Very High to Low	Interception or diversion of groundwater flows due to new structures	Long-term	Negligible	Negligible to Minor Adverse	Not significant	Potential impact on flood risk is long-term, however, if the risk is realised, the flooding would be a short-term event.
Flood Risk – Sewer/ Water Supply	Very High to Low	Additional loading to the airport foul sewerage system and additional water supply infrastructure installed	Long-term	Negligible	Minor Beneficial to Minor Adverse	Not significant	Potential impact on flood risk is long-term, however, if the risk is realised, the flooding would be a short-term event.
Water Infrastructure - Wastewater	Medium	Increased demand on wastewater network due to passenger growth	Long-term	Negligible	Negligible to Minor Adverse	Not significant	
Water Infrastructure - Water Supply	Very Low	Increase in water demand due to passenger growth	Long-term	Low Adverse	Negligible to Minor Adverse	Not significant	

Receptor	Receptor Sensitivity	Description of Impact	Short / Medium / Long Term / Permanent	Magnitude of Impact	Significance of Effect	Significant / Not significant	Notes
River Mole overall effect				Minor Beneficial			
Gatwick Stream overall effect				Minor Adverse			
Crawter's Brook overall effect				Minor Adverse			
Burstow Stream overall effect				Negligible			

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Flood and Water Management Act 2010

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11.15 Glossary

Table 11.15.1: Glossary of Terms

Term	Description
AEP	Annual Exceedance Probability
AOD	Above Ordnance Datum
ATMs	Air Traffic Movements
BGS	British Geological Survey
CAMS	Catchment Abstraction Management Strategy
CBC	Crawley Borough Council
CEA	Cumulative Effects Assessment
CoCP	Code of Construction Practice
DCLG	Department of Communities and Local Government
DMRB	Design Manual for Roads and Bridges
EIA	Environmental Impact Assessment
ES	Environmental Statement
EU	European Union
FCA	Flood Compensation Area
FRA	Flood Risk Assessment
GEP	Good Ecological Potential
GES	Good Ecological Status
GI	Ground Investigation
GWDTE	Groundwater Dependent Terrestrial Ecosystem
LLFA	Lead Local Flood Authority
LNR	Local Nature Reserve
mbgl	Metres below ground level
Ml/d	Megaliters (one million litres) per day
NPPF	National Planning Policy Framework
NPPG	National Planning Practice Guidance
NPS	National Policy Statement
Ofwat	The (England and Wales) Water Services Regulation Authority
PEIR	Preliminary Environmental Information Report
PINS	Planning Inspectorate
PS	Pumping Station
RBD	River Basin District
RBMP	River Basin Management Plan
RoFSW	Risk of Flooding from Surface Water
RTD	River Terrace Deposits
SAC	Special Area of Conservation
SESW	Sutton and East Surrey Water

Term	Description
SFRA	Strategic Flood Risk Assessment
SPA	Special Protection Area
SPZ	Source Protection Zone
SSSI	Site of Special Scientific Interest
STW	Sewage Treatment Works
SWMP	Surface Water Management Plan
TW	Thames Water
UKCP	United Kingdom Climate Predictions (2009 and 2018)
UWWTD	Urban Wastewater Treatment Directive
ZoI	Zone of Influence

Preliminary Environmental Information Report
Chapter 12: Traffic and Transport

September 2021

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12 Traffic and Transport

12.1. Introduction

12.1.1 This chapter of the Preliminary Environmental Information Report (PEIR) presents the findings of the Environmental Impact Assessment (EIA) work undertaken to date concerning the potential effects of the proposal to make best use of Gatwick's existing runways (referred to within this report as 'the Project') on traffic and transport.

12.1.2 This chapter sets out the assessment methodology and considers the potential traffic and transport effects of the Project during construction and operation. In particular, this PEIR chapter:

- sets out the existing and future environmental baseline conditions, established from desk studies, surveys and consultation to date;
- presents the potential environmental effects on traffic and transport arising from the Project, based on the information gathered and the analysis and assessments undertaken to date;
- identifies any assumptions and limitations encountered in compiling the environmental information; and
- highlights any necessary monitoring and/or mitigation measures that could prevent, minimise, reduce or offset the possible environmental effects identified in the EIA process.

12.1.3 This chapter covers the traffic and transport effects on people arising from the Project and should be read in conjunction with the details of the Project's impact on the transport network performance provided in the Preliminary Transport Assessment Report (PTAR), which is contained in Appendix 12.9.1. This chapter provides an assessment on severance, driver delay, pedestrian and cyclist delay and amenity, accidents and safety, hazardous loads, and effects on public transport amenity based on the approach and methodology set out in the Institute of Environmental Management and Assessment (IEMA) guidance (IEMA, 2004). The PTAR provides more detailed commentary on the current transport operation and the assessments of the Project's impact on the highway network and for specific modes such as rail, bus and coach, as well as active travel. Draft actions and targets for the Airport Surface Access Strategy (ASAS) have been included in this chapter. The effectiveness of these interventions for managing access to the airport and how mode share targets can be achieved is described more fully in the PTAR.

12.1.4 The PEIR will inform pre-application consultation. Following consultation, comments on the PEIR will be reviewed and taken into account in preparation of the Environmental Statement (ES) that will accompany the application to the Planning Inspectorate (PINS) for development consent. The ES will contain an updated assessment arising from any new analysis undertaken following submission of the PEIR and also taking into account any new data. A final Transport Assessment and draft ASAS and Travel Plan will also accompany the application for development consent.

12.2. Legislation and Policy

Legislation

12.2.1 This section identifies the legislation and policy context for traffic and transport. Legislation relevant to traffic and transport includes the Transport Act 2000, the Highways Act 1980, the Infrastructure Act 2015 and the Railways Acts 1993 and 2005.

12.2.2 The Transport Act 2000 contains *'measures to create a more integrated transport system'*. Specific measures include requirements to improve local passenger transport services, and reduce road congestion and pollution, e.g. local transport authorities should produce a Local Transport Plan (LTP) every five years and to keep that plan under review. These plans have been considered in the assessment of traffic and transport.

12.2.3 The Highways Act 1980 sets out the duties of the highway authorities and how the highway network will be managed and operated. Part V of the Highways Act 1980 sets out the legislation on Improvement of Highways and Part VA covers the Environmental Impact Assessment, which is relevant to this chapter. In addition, the Infrastructure Act 2015 defines the role of Highways England as a government-owned company responsible for ensuring improvements to the UK's strategic road network. Highways England is a statutory consultee as part of the application for development consent.

12.2.4 Privatisation of UK railways led to the Railways Act 1993 which governs licensing, access agreements to the railway for operators, access charges and their review and enforcement. The Railways Act 2005 largely amends the Railways Act 1993. The Act makes a number of changes to the regulatory framework, including a change to periodic reviews of access charges and transferring various responsibilities to the Office of Rail and Road (ORR). These Acts designate Network Rail as the owner of rail infrastructure in the UK. Network Rail is a statutory consultee as part of this application for development consent.

12.2.5 On 20 May 2021, the Williams-Shapps plan for rail was announced by Government. This White Paper sets out the Government's plan for "a revolution on the railways" in Great Britain in terms of replacing the franchising model, accelerating innovation and technological change, levelling-up the country and cleaner, greener rail travel. The plan envisages a new agency, Great British Railways, which will absorb Network Rail as well as parts of the Department for Transport's and ORR's rail functions. This section will be updated for the final ES to reflect any changes resulting from the White Paper.

Planning Policy Context

National Policy Statements[1]

12.2.6 The Airports National Policy Statement (NPS) (Department for Transport, 2018), although primarily provided in relation to a new runway at Heathrow Airport, remains a relevant consideration for other applications for airport infrastructure in London and the south east of England.

[1] In July 2021, Government published its plan to decarbonise UK transport to net zero by 2050 with a number of strategic priorities discussed, including accelerating modal shift to public and active transport, decarbonisation of road transport through transition to zero emission road vehicles, decarbonising goods delivery, making the UK a hub for green transport technology, promoting place-based strategies for emissions reduction as well as reducing the UK's global impact on carbon through initiatives such as Jet Zero to decarbonise the aviation sector. These priorities align with the Government's Ten Point Plan for a Green Industrial Revolution. Given that the policy is under development, this section of the PTAR will be updated for the final ES. However, Gatwick is committed to low-carbon growth and its Decade of Change strategy sets ambitious carbon reduction targets.

12.2.7 The NPS for National Networks (Department for Transport, 2015[2]) sets out the need for development of road, rail and strategic rail freight interchange projects on the national networks and the policy against which decisions on major road and rail projects will be made. This has been taken into account in relation to the highway improvements proposed as part of the Project.

12.2.8 Table 12.2.1 provides a summary of the relevant requirements of these NPSs and how these are addressed within the PEIR.

Table 12.2.1: Summary of NPS Information Relevant to this Chapter

Summary of NPS requirement	How and where considered in the PEIR
Airports NPS	
Para 5.9 – "The applicant must prepare an airport surface access strategy in conjunction with its Airport Transport Forum, in accordance with the guidance contained in the Aviation Policy Framework. The airport surface access strategy must reflect the needs of the scheme contained in the application for development consent, including any phasing over its development, implementation and operational stages, reflecting the changing number of passengers, freight operators and airport workers attributable to the number of air traffic movements. The strategy should reference the role of surface transport in relation to air quality and carbon. The airport surface access strategy must contain specific targets for maximising the proportion of journeys made to the airport by public transport, cycling or walking. The strategy should also contain actions, policies and defined performance indicators for delivering against targets, and should include a mechanism whereby the Airport Transport Forum can oversee implementation of the strategy and monitor progress against targets alongside the implementation and operation of the preferred scheme."	Draft actions and targets for the Airport Surface Access Strategy are included in the Preliminary Transport Assessment Report (Appendix 12.9.1). The final strategy in the application for development consent will be prepared in conjunction with Gatwick's Airport Transport Forum and in accordance with the Aviation Policy Framework guidance.
Para 5.10 – "The applicant should assess the implications of airport expansion on surface access network capacity using the WebTAG methodology [now TAG] stipulated in the Department for Transport guidance, or any successor to such methodology. The applicant should consult Highways England, Network Rail and highway and transport authorities, as appropriate, on the assessment and proposed mitigation measures. The assessment should distinguish between the construction and	Assessment methodology is in accordance with TAG guidance and consultation with authorities is ongoing (see Sections 12.3 and 12.4). Both construction and operational effects have been assessed in this chapter (see Section 12.9). Further information on network performance is included in the PTAR (Appendix 12.9.1).

[2] It is noted that the Transport Decarbonisation Plan published by Department for Transport (DfT) on 14 July 2021 announced DfT's intention to review the NPS for National Networks in due course once demand patterns post-pandemic become clearer. It is understood DfT intends to commence the review by the end of 2021 and complete it by Spring 2023. In the interim and whilst the review is undertaken, DfT has confirmed the NPS for National Networks remains relevant government policy and has full force and effect for the purposes of the Planning Act 2008.

Summary of NPS requirement	How and where considered in the PEIR
operational project stages for the development comprised in the application."	
Para 5.11 – "The applicant should also consult with Highways England, Network Rail and relevant highway and transport authorities, and transport operators, to understand the target completion dates of any third party or external schemes included in existing rail, road or other transport investment plans. It will need to assess the effects of the preferred scheme as influenced by such schemes and plans. Such consultation and assessment, both of third party schemes on which the preferred scheme depends, and others which interact with it, all of which may be subject to their own planning, funding and approval processes, must be understood in terms of implications of the timings for the applicant's own surface access proposals."	Consultation took place with authorities (see Section 12.3), and relevant cumulative schemes are included in the assessments contained in this chapter. Further information on the schemes is included in the PTAR (Appendix 12.9.1) and its Annex B.
Para 5.13 – "For schemes and related surface access proposals or other works impacting on the strategic road network, the applicant should have regard to Department for Transport Circular 02/2013, *The Strategic Road Network and the delivery of sustainable development* (or prevailing policy), and the National Networks NPS. This sets out the way in which the highway authority for the strategic road network will engage with communities and the development industry to deliver sustainable development and economic growth, whilst safeguarding the primary function and purpose of the network."	The design of the Project and this assessment gives regard to the Department for Transport Circular, the delivery of sustainable development and the National Networks NPS.
Para 5.14 – "The surface access systems and proposed airport infrastructure may have the potential to result in severance in some locations. Where appropriate, the applicant should seek to deliver improvements or mitigation measures that reduce community severance and improve accessibility."	Embedded mitigation measures to reduce community severance and improve accessibility are set out in Section 12.8 of this chapter.
Para 5.17 – "Any application for development consent and accompanying airport surface access strategy must include details of how the applicant will increase the proportion of journeys made to the airport by public transport, cycling and walking..."	See Section 12.8 and Preliminary Transport Assessment Report in Appendix 12.9.1 for further details on how sustainable transport will be encouraged. The targets in the NPS described for 2030 and 2040 relate specifically to the Heathrow Runway 3 project ("5.1 This chapter focuses on the potential impacts of the Heathrow Northwest Runway scheme"). Nevertheless, Gatwick Airport is targeting a 60% mode share by sustainable modes by 2030 for passengers and staff with the Project as described in Section 12.6 and within the PTAR (Appendix 12.9.1).

Summary of NPS requirement	How and where considered in the PEIR
Para 5.18 – "The applicant should commit to annual public reporting on performance against these specific targets. The airport surface access strategy should consider measures and incentives which could help to manage demand by car users travelling to and from the airport, as well as physical infrastructure interventions, having at all times due regard to the effect of its strategy on the surrounding area and transport networks. The strategy should also include an assessment of the feasibility of the measures proposed as well as the benefits and disbenefits related to those measures, including any implications for Highways England, Network Rail and affected relevant highway authorities and transport providers. These measures could be used to help achieve mode share targets and should be considered in conjunction with measures to mitigate air quality impacts as described in the Airports NPS."	Gatwick is proposing draft targets and actions for the ASAS, details of which have been included as part of this PEIR and will publicly reported annually against these targets. These targets will be prepared in conjunction with Gatwick's Airport Transport Forum and in accordance with the Aviation Policy Framework
NPS for National Networks	
Para 3.17 - "There is a direct role for the national road network to play in helping pedestrians and cyclists. The Government expects applicants to use reasonable endeavors to address the needs of cyclists and pedestrians in the design of new schemes. The Government also expects applicants to identify opportunities to invest in infrastructure in locations where the national road network severs communities and acts as a barrier to cycling and walking, by correcting historic problems, retrofitting the latest solutions and ensuring that it is easy and safe for cyclists to use junctions."	See Section 12.8 and active travel section in Appendix 12.9.1 for further details.
Para 3.20 - "The Government's strategy for improving accessibility for disabled people is set out in Transport for Everyone: an action plan to improve accessibility for all. In particular: ▪ The Government will continue to work to ensure that the bus and train fleets comply with modern access standards by 2020, and to improve rail station access for passengers with reduced mobility. The private car will continue to play an important role, providing disabled people with independence where other forms of transport are not accessible or available. ▪ The Government expects applicants to improve access, wherever possible, on and around the national networks by designing and delivering schemes that take account of the accessibility requirements of all those who use, or are	Gatwick aims to be the UK's most accessible airport, giving everybody an equal opportunity to fly. The station has step-free level access to all platforms via lifts and escalators. The Station Project will add five new lifts and eight escalators. There are dedicated drop-off points on forecourts for Blue Badge holders or passengers who have booked assistance at the airport. Gatwick also provides Blue Badge bays in short-stay, long-stay and for valet parking.

Summary of NPS requirement	How and where considered in the PEIR
affected by, national networks infrastructure, including disabled users."	
Para 3.22 - "Severance can be a problem in some locations. Where appropriate applicants should seek to deliver improvements that reduce community severance and improve accessibility."	Embedded mitigation measures to reduce community severance and improve accessibility are set out in Section 12.8 of this chapter.
Para 4.61 and 4.62 – "The applicant should undertake an objective assessment of the impact of the proposed development on safety including the impact of any mitigation measures. This should use the methodology outlined in the guidance from Department for Transport (WebTAG) and from the Highways Agency." "They should also put in place arrangements for undertaking the road safety audit process. Road safety audits are a mandatory requirement for all trunk road highway improvement schemes in the UK (including motorways)."	The assessment is being undertaken in line with TAG guidance and based on DMRB. Road Safety Audits will be undertaken for the highway improvements proposed as part of the Project.
Para 5.201 to 5.212 - This section is on Impacts on Transport Networks and references the applicant to have regard to policies in local plans, consulting with relevant authorities, support for other transport modes, assessing impacts and mitigation in EIA.	Assessment in this chapter is undertaken in accordance with guidance and policies in local plans (see Section 12.4). See Preliminary Transport Assessment Report in Appendix 12.9.1 for details.

National Planning Policy Framework

12.2.9 The National Planning Policy Framework (NPPF) (Ministry of Housing, Community and Local Government, 2021) sets out the planning policies for England. At the heart of the Framework is a presumption in favour of sustainable development.

12.2.10 The NPPF states the following.

'Transport issues should be considered from the earliest stages of plan-making and development proposals, so that:

a) the potential impacts of development on transport networks can be addressed;

b) opportunities from existing or proposed transport infrastructure, and changing transport technology and usage, are realised – for example in relation to the scale, location or density of development that can be accommodated;

c) opportunities to promote walking, cycling and public transport use are identified and pursued;

d) the environmental impacts of traffic and transport infrastructure can be identified, assessed and taken into account – including appropriate opportunities for avoiding and mitigating any adverse effects, and for net environmental gains; and

e) patterns of movement, streets, parking and other transport considerations are integral to the design of schemes, and contribute to making high quality places.' (para 104).

'In assessing sites that may be allocated for development in plans, or specific applications for development, it should be ensured that:

a) appropriate opportunities to promote sustainable transport modes can be – or have been – taken up, given the type of development and its location;

b) safe and suitable access to the site can be achieved for all users;

c) the design of streets, parking areas, other transport elements and the content of associated standards reflects current national guidance, including the National Design Guide and the National Model Design Code 46; and

d) any significant impacts from the development on the transport network (in terms of capacity and congestion), or on highway safety, can be cost effectively mitigated to an acceptable degree.' (para 110).

'Development should only be prevented or refused on highways grounds if there would be an unacceptable impact on highway safety, or the residual cumulative impacts on the road network would be severe' (para 111).

12.2.11 The National Planning Practice Guidance (NPPG) (Ministry of Housing, Communities and Local Government, 2019) supports the NPPF and provides guidance across a range of topic areas. This includes general guidance on 'Travel Plans, Transport Assessments and Statements' (2014). The guidance sets out the overarching principles of the documents, how they relate to each other and why they are important. The key principles of preparing the reports are provided in the guidance together with when they are required and what information they should include.

Other Relevant National Planning Policy

12.2.12 Other relevant national documents include the following.

- Road Investment Strategy 2: 2020-2025 (Department for Transport, 2020) – sets out the five year strategy for investment in and management of the strategic road network.
- The Strategic Road Network and the Delivery of Sustainable Development (Department for Transport, 2013a)
- South East Route Control Period 6 Delivery Plan, Network Rail, March 2019 – This includes reference to support for a 45% rail mode share target for Gatwick Airport.
- Strategic Business Plan 2019 – 2024 (Network Rail, 2018) – Sets out the business plan for Control Period 6 (CP6).
- Periodic Review 2018 (PR18) (Network Rail, 2018) – PR18 establishes outputs and funding for CP6 from 1 April 2019 to 31 March 2024.

Local Planning Policy

12.2.13 Gatwick Airport lies in the administrative area of Crawley Borough Council and adjacent to the boundaries of Mole Valley District Council to the north west, Reigate and Banstead Borough

Council to the north east and Horsham District Council to the south west. From Gatwick Airport, the administrative area of Tandridge District Council is located approximately 1.9 km to the east, Mid Sussex District Council approximately 2 km to the south east. Other local authorities are East Sussex (12 km southeast) and Kent (15 km east). The airport is located within West Sussex County Council and is adjacent to Surrey County Council to the north.

12.2.14 The relevant local planning policies applicable to traffic and transport based on the extent of the study area for this assessment are listed in Table 12.2.2, with further detail and other guidance documents provided in the PTAR contained in Appendix 12.9.1.

Table 12.2.2: Local Planning Policy

Administrative Area	Plan	Policy
Adopted Policy		
West Sussex	West Sussex Transport Plan 2011-2026	West Sussex's approach to transport includes four strategies which are: promoting economic growth; tackling climate change; providing access to services, employment and housing; and improving safety, security and health.
	West Sussex County Council Highway Infrastructure Policy and Strategy 2018	
	West Sussex Walking and Cycling Strategy 2016-2026	
Surrey	Surrey Local Transport Plan 2011-2026	The vision of the Surrey Local Transport Plan is to help people to meet their transport and travel needs effectively, reliably, safely and sustainably within Surrey; in order to promote economic vibrancy, protect and enhance the environment and improve the quality of life.
East Sussex	East Sussex Local Transport Plan 2011-2026	The high-level objectives are to improve economic competitiveness and growth; improve safety, health and security; tackle climate change; Improve accessibility and enhance social inclusion; and improve quality of life.
Kent	Kent Local Transport Plan 2016-2031	The ambition for Kent is to deliver safe and effective transport, ensuring that all Kent's communities and businesses benefit, the environment is enhanced and economic growth is supported.
Mid Sussex	Mid Sussex Infrastructure Delivery Plan 2016	This document supports the objectives outlined in the emerging District Plan 2014-2031 and provides detail on infrastructure needs to support new development.
	Mid Sussex District Plan 2014-2031	Policy DP21 Transport

Administrative Area	Plan	Policy
Crawley	Crawley Borough Local Plan 2015-2030	IN3 Development & Requirements for Sustainable Transport,
		IN4 Car & Cycle Parking Standards
		IN5 The Location & Provision of New Infrastructure
		GAT1 Development of the Airport with a Single Runway
		GAT3 Gatwick Airport Related Parking
Reigate and Banstead	Reigate and Banstead Local Plan: Core Strategy 2014	CS17 Travel Options & Accessibility
	Reigate and Banstead Local Plan: Development Management Plan 2018-2027 (2019)	TAP1 Access, Parking and Servicing
		TAP2 Airport Car Parking
		HOR09 Horley Strategic Business Park
Mole Valley	Core Strategy 2009	CS18 Transport Options & Accessibility
	Local Plan 2000	RUD28 Off Airport Carparking
		MOV2 The Movement Implications of New Development
		MOV5 Parking Standards
Horsham	Horsham District Planning Framework (excluding South Downs National Park) 2015	Policy 40 Sustainable Transport
		Policy 41 Parking
Tandridge	Core Strategy 2008	CSP12 Managing Travel Demand
	Tandridge Local Plan Part 2: Detailed Policies 2014-2029	DP5 Highway Safety & Design
Emerging Policy		
West Sussex	Draft West Sussex Transport Plan 2022 to 2036	The vision includes for the transport network to be on a pathway to net zero carbon by 2050 through mass electrification, reduced use of fossil-fuels and local living. The transport network will also be safer and more efficient overall with more walking, cycling and use of public or shared transport and less congestion on major routes that connect West Sussex towns with Gatwick Airport, London and nearby cities. Objective 13 is to minimise the impacts on the transport network of surface access to Gatwick Airport by passengers and employees and ensure transport network improvements take the needs of other users and communities that share these routes into account.

Administrative Area	Plan	Policy
Surrey	Draft Local Transport Plan 2022–2032	The draft local transport plan aims to significantly reduce transport carbon emissions to meet the net zero challenge and to support delivery of Surrey's other priority objectives of enhancing Surrey's economy and communities, as well as the health and quality of life of our residents.
Crawley	Draft Crawley Borough Local Plan 2021-2037	SD1 Presumption in Favour of Sustainable Development
		SD2 Enabling Healthy Lifestyles and Wellbeing
		ST1 Development and Requirements for Sustainable Transport
		ST2 Car and Cycle Parking Standards
		ST3 Improving Rail Stations
		ST4 Safeguarding of a Search Corridor for a Crawley Western Relief Road
		GAT1 Development of the Airport with a Single Runway
		GAT3 Gatwick Airport Related Parking
Tandridge	Our Local Plan 2033	TLP50 Sustainable Transport & Travel
		TLP51 Airport Related Parking
Mole Valley	Future Mole Valley 2018-2033	INF1 Promoting Sustainable Transport and Parking
Horsham	Draft Horsham District Local Plan 2019-2036	Strategic Policy 41 - Infrastructure Provision
		Strategic Policy 42 - Sustainable Transport
		Policy 43 - Parking
		Policy 44 - Gatwick Airport Safeguarded Land

12.3. Consultation and Engagement

12.3.1 In September 2019, Gatwick Airport Limited (GAL) submitted a Scoping Report to the Planning Inspectorate, which described the scope and methodology for the technical studies being undertaken to provide an assessment of any likely significant effects and, where necessary, to determine suitable mitigation measures for the construction and operational phases of the Project. It also described those topics or sub-topics which are proposed to be scoped out of the EIA process and provided justification as to why the Project would not have the potential to give rise to significant environmental effects in these areas.

12.3.2 Following consultation with the statutory bodies, the Planning Inspectorate (on behalf of the Secretary of State) provided a Scoping Opinion on the 14 October 2019.

12.3.3 Key issues raised during the scoping process specific to traffic and transport are listed in Table 12.3.1, together with details of how these issues have been addressed within the PEIR. See Appendix 12.3.1 for a more detailed summary of stakeholder consultation and responses.

Table 12.3.1: Summary of Scoping Responses

PINS Ref	Summary of comment	How/where addressed in PEIR
2.3.6	There is limited information in the Scoping Report relevant to the North and South terminal junction access improvements.	A description of the highway works is included in Chapter 5: Project Description. More details will be provided in the final ES if design development evolves in consultation with Highways England and local highway authorities.
3.3.18	Any mitigation relied upon for the purposes of the assessment should be explained in detail within the ES. The likely efficacy of the mitigation proposed should be explained with reference to residual effects. The ES should also address how any mitigation proposed is secured.	See Section 12.8 on the Mitigation and Enhancement Measures which are relied upon for the purposes of this assessment.
4.6.3	The ES should clearly present the periods over which data has been collected and where previous sources are being relied upon, justification should be provided to demonstrate the suitability of such data.	See paragraphs 12.4.20 to 12.4.24 on data collection and Section 12.6 on the justification of the data sources.
4.6.4	Any such assumptions which influence the definition of future baseline conditions (passenger and employee modal shares) should be clearly presented in the ES and be subject to sensitivity testing where applicable such that consideration is given to different mode share scenarios in assessing a worst case scenario. The Scoping Report makes no reference to the provision of travel plans associated with the Project (for example in relation to staff travel). The ES should explain the need for / absence of such plans in delivering mitigation measures in order to achieve the predicted and assessed modal shares.	See Section 12.5 on Assumptions and Limitations of the Assessment. Section 12.6 covers future baseline conditions. Section 12.8 covers Mitigation which includes developing an appropriate Travel Plan.
4.6.5	The ES should assess the impacts to the rail network taking into account the anticipated capacity and projected growth from increased passenger and employee movements (as well as nonairport user increases as a result of the Proposed Development). Cumulative impacts with planned and necessary	The rail capacity as well as the station modelling undertaken in Legion, both reported in this chapter (see 'Effects on Public Transport Amenity' section for each assessment year), assume a

PINS Ref	Summary of comment	How/where addressed in PEIR
	developments to achieve this anticipated growth should also be assessed in demonstrating the validity of capacity assumptions set out in the ES.	proportion of visitors (meeter-greeters, well-wishers) as well as commuter use of Gatwick Airport railway station and rail services. The strategic modelling of rail capacity has been developed using a number of sources and includes all journeys made by airport passengers, airport employees and all other users of Gatwick Airport railway station and is reported under each assessment year. Cumulative development will be considered in the final ES.
4.6.6	The Applicant should ensure that the relationship between the TA and the scope of the traffic and transport assessment is fully explained and justified within the ES.	See paragraphs 12.1.3 and 12.1.4. Further details on the scope of this chapter are provided in Table 12.4.1.
4.6.7	Diagram 7.6.1 splits airport-related highway demand into passenger and employee trips, but does not set out how trips by airport supplier goods delivery trips and visitors to the airport (people using the airport hotels without being air passengers or visitors to on-airport businesses) will be accounted for in the modelling.	See Section 12.5 on Assumptions and Limitations of the Assessment. Airport supplier, cargo and logistics, i.e. delivery trips, as well as non-airport users including visitors and commuters are included in the modelling.
4.6.8	It is clear that significant engagement is planned and ongoing with the relevant consultation bodies (particularly as part of the surface access topic working group). Agreements reached with consultation bodies on the Applicant's methodological approach to the assessment (as part of the topic working group) should be documented in the ES where relevant.	See Section 12.3.4 on Consultation and Engagement.
4.6.9	The assessment should demonstrate how the worst-case construction and operational assessment scenarios and assumptions are considered with regard to trip generation and modal splits. The construction and operational assessment should clearly set out how impacts associated with closures or delays on the M23, M25 or the A217 have been considered. In particular, the potential for increased traffic on the villages of Hookwood and Charlwood should be specifically considered given anticipated	See Section 12.5 on Assumptions and Limitations of the Assessment, including on construction and operational traffic. Further information on the strategic modelling work in contained in the PTAR (Appendix 12.9.1) and the work will be developed further for the Transport Assessment to be

PINS Ref	Summary of comment	How/where addressed in PEIR
	duration of the proposed construction works to the north and south terminal junctions and the impacts on these villages in the event of a closure(s) during operation.	submitted as part of the application for development consent.
4.6.10	Assumptions around the increased movements of freight during operation should be explained and ideally quantified.	The highway modelling used to inform this PEIR includes freight and logistics movements related to the Airport. These have been uplifted in line with the projected increase in freight tonnage through the Airport in the future baseline and with Project scenario. Further work will be undertaken for the final ES for a more detailed assessment of freight as part of the strategic transport modelling work.
4.6.11	The Inspectorate is unclear what is meant by the creation of an "integrated travel application for passengers and staff…facilitating Mobility-as-a-Service".	GAL envisage an integrated travel planning tool, either hosted on or directed via the Airport's website and accessible on a mobile device through an app. Using this app, passengers, customers and employees will be able to choose across a range of surface transport modes, enabling Mobility-as-a-Service, whereby a person can choose across a range of modes to access the airport weighing up next available service, frequency of service and cost in one integrated platform.
4.6.12	The ES should explain the relevant provisions for the Applicant to monitor surface access impacts. No further information is provided as to the metrics of such monitoring, how "success" will be determined and what remedial actions (if any) could be involved.	See Section 12.8 on the Mitigation and Enhancement Measures. The targets and metrics for success will be defined in the ASAS and Travel Plan prepared in conjunction with Gatwick's Airport Transport Forum and in accordance with the Aviation Policy Framework guidance.
4.6.13	The Scoping Report proposes that a Construction Traffic Management Strategy (CTMS), will be	See Section 12.5 on Assumptions and Limitations. Further work is

PINS Ref	Summary of comment	How/where addressed in PEIR
	implemented to deliver mitigation measures. Any assumptions made in this regard should be set out in the ES, which should reflect a worst case scenario in the absence of such commitments being guaranteed. In particular, the description of the Proposed Development in the ES should explain the extent to which existing infrastructure would allow for such deliveries by rail.	being undertaken by GAL's construction team and the assessment will be refined for the final ES once more details are known.
4.6.14	Paragraphs 5.3.14 to 5.3.16 of the Scoping Report explains that there is some uncertainty around the need for and location of a Construction Logistics Consolidation Centre. Where such a facility is required, volumes of trips between this compound and main construction locations should be presented. Where uncertainty exists, a worst case should be assumed with respect to additional traffic generation on the local and strategic highway networks. The Applicant should have regard to Transport for London's Construction and Logistics Plan (CLP) guidance in this respect.	See Section 12.5 on Assumptions and Limitations. GAL has had regard to Transport for London's Construction and Logistics Plan (CLP) guidance.

12.3.4 Key issues raised during consultation and engagement with interested parties specific to traffic and transport are listed in Table 12.3.2, together with details of how these issues have been addressed within the PEIR. Engagement with stakeholders is ongoing and details of further consultation will be presented within the ES.

Table 12.3.2: Summary of Consultation

Consultee	Date	Details	How/where addressed in PEIR
Department for Transport	23 April 2019	Meeting held to discuss master plan scenarios and modelling approach to assess the potential effects on the transport network.	N/A. Initial briefing session. No actions for PEIR.
Highways England	Various, early 2019	Various meetings held in early 2019 to discuss master plan scenarios and Highways England expectations around both modelling and testing of effects and potential mitigation on the highway network.	N/A. Initial briefing sessions. No actions for PEIR. Agreement on use of South East Regional Transport Model (SERTM) for future strategic modelling.
	01 October 2019	Meeting with Highways England to discuss approach for PEIR, potential surface access improvements options, strategic highway modelling.	Meeting to discuss modelling approach and potential improvements. Highways England set out its expectations around process, engagement,

Consultee	Date	Details	How/where addressed in PEIR
			considerations (including the need to model network impacts during highway construction) and how to interface the Gatwick and Highways England teams on design issues.
	26 November 2019	Meeting on governance and forward engagement, design progress, surface access modelling programme, PINS engagement and DCO programme.	N/A. Ongoing engagement with Highways England.
	07 January 2020	Meeting to discuss potential concepts for surface access improvements on the strategic road network.	Surface access improvements options have been considered and tested in the PEIR.
	13 February 2020	To discuss VISSIM modelling outputs in the context of different highway options for 2047 future baseline and 2047 with Northern Runway Project (NRP).	VISSIM modelling has been included in the PTAR.
	26 October 2020	A meeting with Highways England to confirm the recommencement of the Project after a pause because of the Covid-19 pandemic. This included a recap on where the work had got to in Spring 2020 and next steps.	N/A. Meeting confirming project restart.
	02 February 2021	Given a change in personnel on the Highways England team considering GAL's DCO application, a briefing on all aspects of the project including proposed surface access improvements, VISSIM modelling demonstrating the appropriateness of the surface access improvements, strategic transport modelling including highway modelling and a proposed engagement schedule with Highways England.	Surface access improvement options have been considered and tested in the PEIR. Strategic transport modelling, including highway modelling, forms the basis of the assessment of effects for highway users. VISSIM modelling has been included in the PTAR.
	13 April 2021	The purpose of this meeting was to provide new team members at Highways England with an overview of the highway network serving GAL and the design development of surface access improvements to support growth at the Airport with NRP.	

Consultee	Date	Details	How/where addressed in PEIR
	Various inc. 17 May, 27 May and 15 June 2021	Meetings to discuss project governance, Highways England engagement and milestones to DCO submission	Non-technical meetings to discuss collaborative engagement through to DCO submission.
	06 July 2021	Meeting held with Highways England to discuss the status of strategic modelling and to set out the strategy for engagement through to DCO submission.	Meeting confirming project restart and further modelling and strategy to inform DCO submission. No further actions for PIER.
West Sussex County Council	15 April 2019	Meeting held with West Sussex surface access and modelling leads on to discuss master plan scenarios, West Sussex's expectations, a potential modelling approach and study area, including access to the Crawley model network.	N/A. Initial briefing session. No actions for PEIR. Agreement on use of West Sussex's Crawley Model for future strategic modelling. Note engagement with other Local Authorities has also taken place as described later in this table.
Network Rail	13 February 2019	Meeting held with Network Rail to discuss master plan scenarios and potential impacts on the station, South Terminal and inter-terminal shuttle. Network Rail agreed to release the Legion model used for business case modelling of the station project for use by Gatwick in relation to the DCO.	Agreement on use of Network Rail's Legion model for station testing, which has informed crowding for PEIR.
	11 July 2019	Meeting to discuss and agree preliminary Legion modelling of the station.	Preliminary Legion model outputs are provided in Section 12.9 of this chapter.
	04 December 2019	Meeting to discuss use of rail to transport project-related construction materials and spoil.	N/A. However, any construction material by rail would mitigate the construction traffic impacts described in this chapter.
	10 December 2019	Meeting to discuss further Legion modelling of the station and to discuss route capacity enhancements.	Preliminary Legion model outputs are provided in Section 12.9 of this chapter.
Transport for London	16 April 2019	Meeting held with Transport for London to discuss master plan scenarios and the approach to modelling and testing effects, including access to the London Highway Assignment Model (LoHAM) model network.	N/A. Initial briefing session. No actions for PEIR. Agreement on use of TfL's LoHAM Model for future strategic modelling.

Consultee	Date	Details	How/where addressed in PEIR
	04 November 2019	Meeting to discuss expectations for assessment, potential modelling approach and study area, assumptions regarding rail access and onward travel across London.	N/A. More relevant to strategic modelling for the final ES.
	14 April 2021	Update on progress towards DCO submission, in particular the outline programme to consultation, progress and forthcoming outputs on surface transport modelling and transport assessment. Other subjects covered included the recently introduced Forecourt Charging at Gatwick and the Mayor's Financial Sustainability Plan with potential user charging concepts for London.	N/A. Further briefing and discussion.
Local Authorities	21 August 2019	Meeting with Mid Sussex Borough Council, West Sussex County Council, Mole Valley Borough Council, Crawley Borough Council, Surrey County Council, East Sussex County Council, Tandridge Borough Council, Reigate and Banstead Borough Council to describe approach for the Project, including PEIR.	N/A. Initial briefing session. No specific comments on the approach for traffic and transport assessment for PEIR. Actions related to A27 and cumulative development for strategic modelling which will be undertaken for the ES.
	04 February 2020	Meeting with Mid Sussex Borough Council, West Sussex County Council, Mole Valley Borough Council, Crawley Borough Council, Surrey County Council, East Sussex County Council, Kent County Council, Tandridge Borough Council, Reigate and Banstead Borough Council to describe approach for the Project, including an update on the assessment for PEIR.	The assessment for PEIR was presented and discussed including forecasting, the highway assessment, the public transport assessment including rail and station, construction, the surface access improvements options, the Airport Surface Access Strategy and initial mode share targets. Progress with the strategic transport modelling was also presented.
	27 July 2021	Meeting with Mid Sussex Borough Council, West Sussex County Council, Mole Valley Borough Council, Crawley Borough Council, Surrey County Council, East Sussex County Council,	An update on emerging findings from the assessment for PEIR including updated forecasts, draft actions and targets in the Airport Surface Access Strategy

Consultee	Date	Details	How/where addressed in PEIR
		Kent County Council, Tandridge Borough Council, Reigate and Banstead Borough Council to describe approach for the Project, including an update on the assessment for PEIR.	including mode share, the highway assessment and proposed highway mitigation, airfield and highway construction impacts, the public transport assessment including rail and railway station performance.
Highway Authorities	11 November 2019	Meeting held with Highways England, West Sussex and Surrey County Councils at Gatwick to discuss strategic modelling and the Model Specification Report (MSR). The meeting discussed components of the modelling including demand types, time periods, strategic model to VISSIM integration, committed highway schemes to be included in the modelling etc. This was the first of series of planned meetings with Highway Authorities on the transport modelling.	The methodology used for the assessment is presented in Section 12.4 with further information provided in Appendix 12.9.1.
	12 December 2019	Meeting held with Highways England, West Sussex and Surrey County Councils at Gatwick to discuss strategic modelling, including model validation, demand forecasting, future transport schemes and forecast scenarios.	As above. Ongoing work related to strategic modelling for the final ES and TA.
	25 February 2020	Meeting held with Highways England, West Sussex and Surrey County Councils at Gatwick to discuss strategic modelling technical notes issued by Arup on behalf of GAL.	As above. Ongoing work related to strategic modelling for the final ES and TA.
	07 July 2021	Meeting held with Surrey to discuss the status of strategic modelling and to set out the strategy for engagement through to DCO submission.	Meeting confirming project restart and further modelling and strategy to inform DCO submission. No further actions for PIER
	14 July 2021	Meeting held with West Sussex to discuss the status of strategic modelling and to set out the strategy for engagement through to DCO submission.	Meeting confirming project restart and further modelling and strategy to inform DCO submission. No further actions for PIER

Consultee	Date	Details	How/where addressed in PEIR
Planning Inspectorate (PINS)	15 November 2019	Meeting held with PINS to respond to comments provided on the Environmental Impact Assessment Scoping Report, including in relation to cumulative development which impacts upon the strategic transport modelling.	The methodology used for the assessment is presented in Section 12.4 with further information provided in Appendix 12.9.1.
	03 February 2021	Meeting held with PINS to restart DCO engagement on the Project after a short pause related to Covid. Discussion on NSIPs, Heathrow Runway 3 and in relation to cumulative development which will impact upon the next stage of strategic transport modelling.	Meeting confirming project restart and further modelling and strategy to inform DCO submission. No further actions for PIER

12.4. Assessment Methodology

Relevant Guidance

12.4.1 The assessment of the traffic and transport effects has been undertaken in accordance with the following guidance:

- IEMA (2004), Guidelines for Environmental Impact Assessment.
- Design Manual for Roads and Bridges (DMRB), in particular LA 101 Introduction to Environmental Assessment, LA 103 Scoping Projects for Environmental Assessment, LA 104 Environmental Assessment and Monitoring. The assessments for LA 112 Population and Human Heath are contained in Chapter 18: Agricultural Land Use and Recreation.
- The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017

Scope of the Assessment

12.4.2 The scope of this PEIR has been developed in consultation with relevant statutory and non-statutory consultees as detailed in Table 12.3.1 and Table 12.3.2.

12.4.3 Taking into account the scoping and consultation process, Table 12.4.1 summarises the issues considered as part of this assessment. No effects identified in the scoping and consultation process to date have been scoped out. However, DMRB guidance on driver stress and view from the road assessments have since been withdrawn. These were originally included in the scoping in order to comply with the published DMRB at the time of writing. On the basis that these elements of the DMRB have been withdrawn, driver stress and view from the road effects have now been excluded from this assessment.

Table 12.4.1: Issues Considered within the Assessment

Activity	Potential Effects	Receptor
Construction Phase (including Demolition): Traffic and Transport		
Construction and demolition activities	Traffic generation and % change for local highway network (including construction materials, cut/fill, staff)	Highway users (all modes)
	Severance – local highway network	Highway users (all modes)
	Driver delay – local highway network, including during construction of highway junctions	Highway users (all modes)
	Pedestrian and cyclist delay – local highway network, including during construction of highway junctions	Pedestrian and cycle modes
	Pedestrian and cyclist amenity – local highway network, including during construction of highway junctions	Pedestrian and cycle modes
	Accidents and safety	Highway users (all modes)
	Hazardous loads	Highway users (all modes)
	Effects on rail network and rail users, such as crowding	Rail users
	Effects on other public transport services and users (eg bus and coach, such as amenity)	Public transport users
Operational Phase: Traffic and Transport		
Use of airport, including upgraded highway junctions	Traffic generation and % change for local highway network (staff and passengers)	Highway users (all modes)
	Severance – local highway network	Highway users (all modes)
	Driver delay – local highway network	Highway users (all modes)
	Pedestrian and cyclist delay – local highway network	Pedestrian and cycle modes
	Pedestrian and cyclist amenity – local highway network	Pedestrian and cycle modes
	Accidents and safety	Highway users (all modes)
	Hazardous loads	Highway users (all modes)
	Effects on rail network and rail users, such as crowding	Rail users
	Effects on other public transport services and users (eg bus and coach, such as amenity)	Public transport users

12.4.4 This chapter has been prepared in accordance with the government guidance in the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 as amended, which states that the emphasis should be on the “main” or “significant” environmental effects to which a development is likely to give rise. The Environmental Statement should be proportionate and not be any longer than is necessary to assess properly those effects. Where, for example, only one environmental factor is likely to be significantly affected, the assessment should focus on that issue only. Impacts which have little or no significance for the particular development in question will need only very brief treatment to indicate that their possible relevance has been considered.

Study Area

Highway Network

12.4.5 Strategic modelling work has informed the extent of the study area. The modelling work has been undertaken in consultation with Highways England and the relevant highway authorities. Further discussion on the approach and methodology is provided in Appendix 12.9.1. The highway peak hours examined in this assessment are:

- AM Peak 1 (AM1) – 0700 to 0800;
- AM Peak 2 (AM2) – 0800 to 0900;
- Interpeak (IP) – average hour between 0900 and 1600; and
- PM Peak (PM) – average hour between 1600 and 1800, as 1600-1700 and 1700-1800 are very similar in terms of flows.

12.4.6 The choice of hours being assessed is subject to further discussion with highway authorities.

12.4.7 For the Initial Construction Phase (2024-2029), AM1 and PM peak periods are reported. This is because the estimated vehicle trip generation for airfield construction is 33 vehicles (HGVs and LGVs) arriving and departing per hour, and 150 construction worker vehicles arriving between 0700 and 0800 (AM1), and departing after the PM peak hour. Therefore, these two peak periods represent the most robust time periods for assessment of the network.

12.4.8 The approach to defining the study area for assessment of the environmental effects the traffic and transport is to firstly use Rules 1 and 2 defined in the IEMA (2004) guidance:

- Rule 1 – include highway links where traffic flows will increase by more than 30% (or the number of Heavy Goods Vehicles (HGVs) will increase by more than 30%); and
- Rule 2 – include any other specifically sensitive areas where traffic flows have increased by 10% or more.

12.4.9 To focus on the extent to which significant Project-related effects are likely to arise and to exclude any potential effects of minor flow variations in the region wide strategic modelling outputs, the additional screening thresholds described below have been applied to each of the rules. These have been developed with reference to the assessment criteria and magnitude of impacts (see paragraphs 12.4.37 onwards).

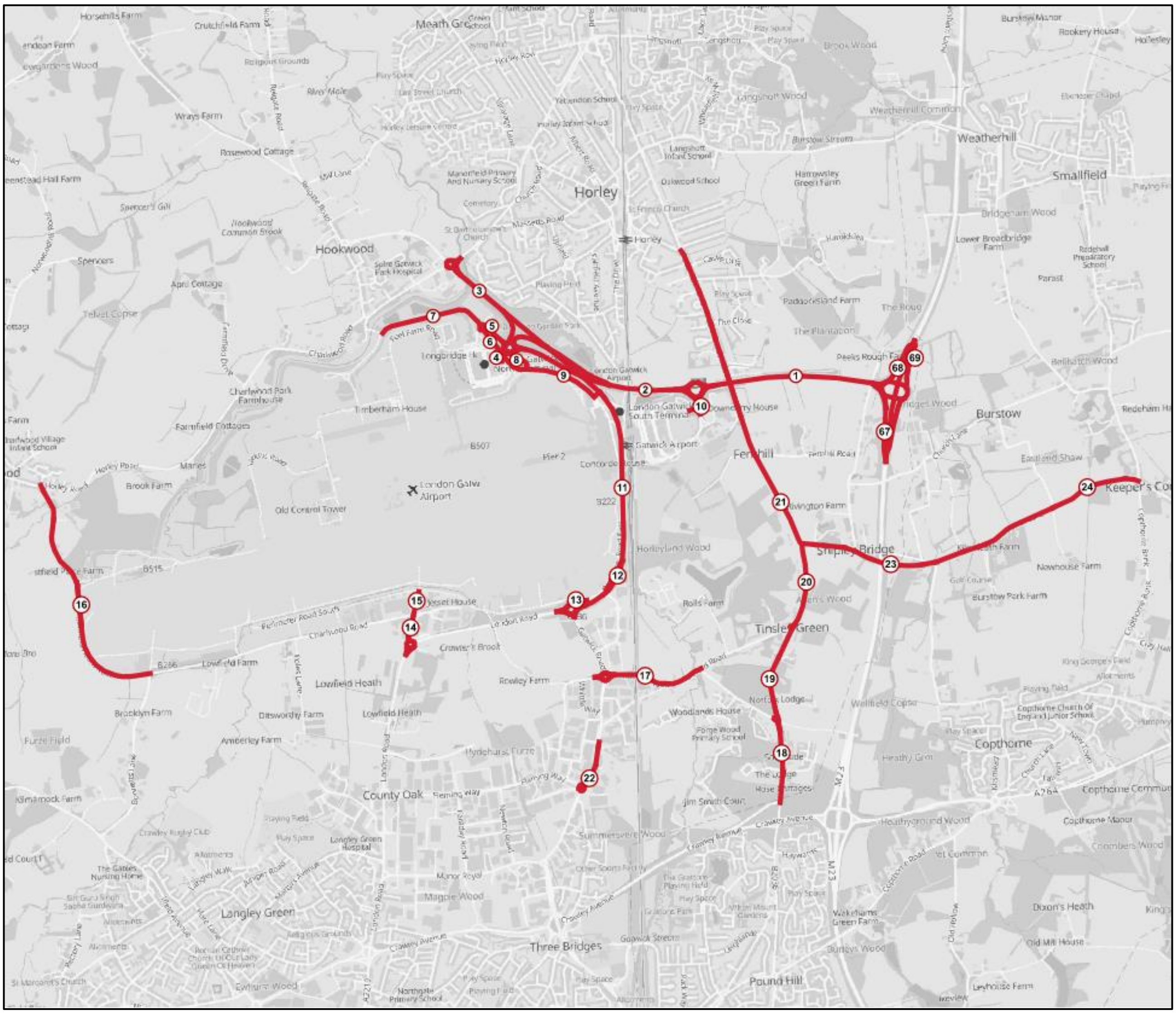
- Rule 1 – Where the change in total traffic is more than 30%, include links where the absolute difference is greater than two vehicles per minute and on links where the model is showing at least one vehicle in the future baseline (ie excluding routes with zero traffic). Where the change in HGVs is more than 30%, include links where the absolute difference is greater than one HGV every five minutes.
- Rule 2 – Where the change in total traffic is more than 10%, include links where the absolute difference is greater than two vehicles per minute, on links where the model shows at least one vehicle in future baseline (ie excluding routes with zero traffic) and where there are sensitive receptors along the link's frontage.

12.4.10 This chapter covers the traffic and transport effects on people arising from the Project. The thresholds adopted of two vehicles per minute and one HGV every five minutes are on two-way flows, and this level of change is not considered to have an impact on any of the assessment areas within this regard.

12.4.11 Figure 12.4.1 illustrates the distribution of traffic associated with Gatwick Airport. Appendix 12.9.2 provides a review of links within the strategic modelling area which were identified to meet the Rule 1 screening threshold as well as Rule 2 links with sensitive receptors to understand whether a significant effect is likely and therefore should be included in the study area. It should be noted that, irrespective of the significance of the effect, the PTAR includes discussion on highway performance across a wider area including within the Gatwick Diamond[3] as well as the M25, M23 and A27 corridors in terms of volume of traffic and volume over capacity at junctions.

12.4.12 Following the screening process, the resulting extent of the study area is shown in Diagram 12.4.1 for the Gatwick Airport area and Diagram 12.4.2 for other areas for assessment. Larger plans are included as Figures 12.4.2 and 12.4.3. The traffic flows for the links are provided in Appendix 12.9.2.

Diagram 12.4.1: Study Area links for assessment - Gatwick Airport area



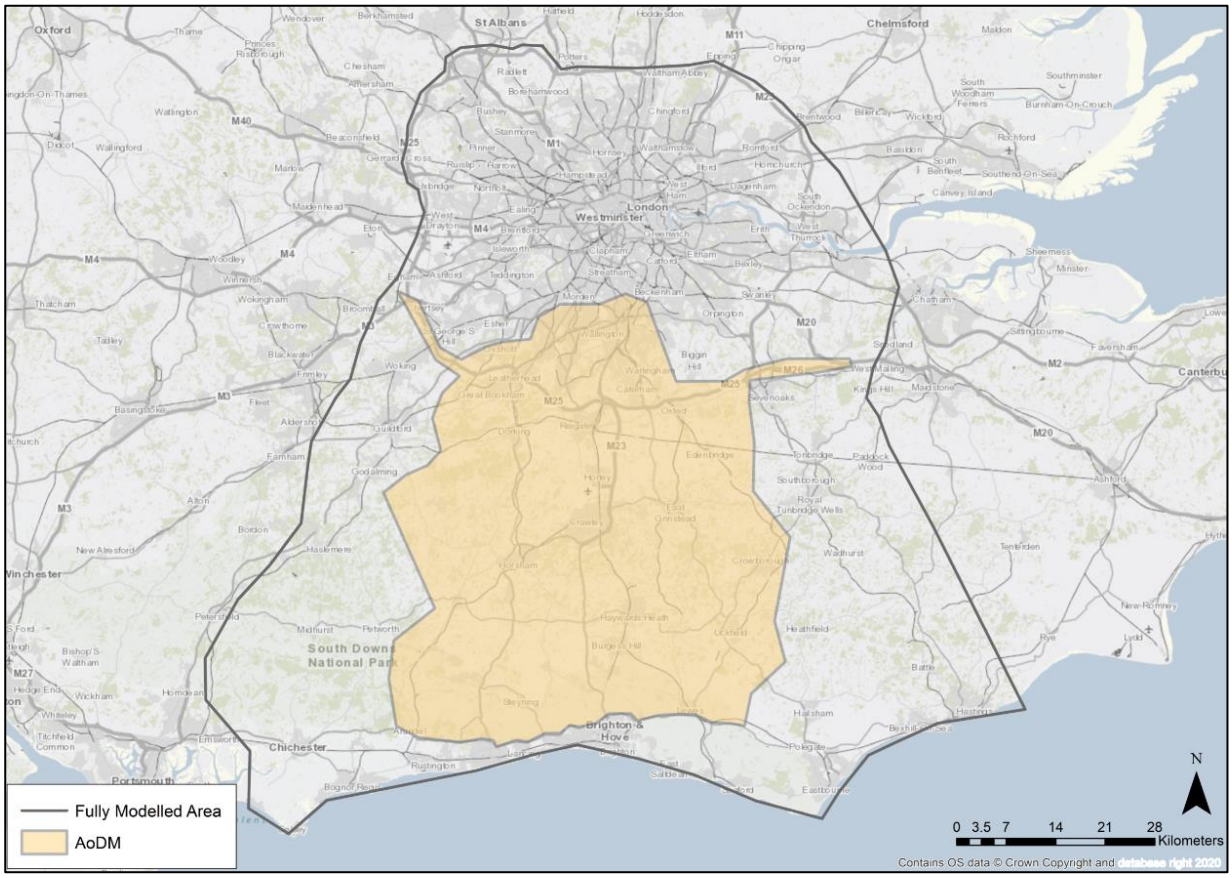
[3] The Gatwick Diamond is an economic area comprising seven local authorities (Crawley, Horsham, Mid Sussex, Tandridge, Reigate & Banstead, Mole Valley and Epsom & Ewell).

Diagram 12.4.2: Study Area links for assessment – other areas for assessment

12.4.13 The above diagram shows that links around Gatwick Airport meet the screening criteria and also some links in the Croydon area, Runnymede, Epsom and at the M25 J7 / M23 J8 junction. The Croydon area of the model will be reviewed and updated further for the ES. The location of Croydon in the Gatwick model means that some trips through this area are sensitive to small cost changes in route choice owing to different areas of fixed and variable speed coding in the model. This results in local flow changes and volume to capacity (V/C) changes at junctions. These changes are not related to the Project.

12.4.14 For the assessment of driver delay, the approach is to consider all junctions within the strategic highway assignment model coverage, as shown in Diagram 12.4.3, with a V/C of over 85% (see paragraph 12.4.42 on the assessment methodology).

Diagram 12.4.3: Highway Assignment Model Coverage and Area of Detailed Modelling (AoDM)



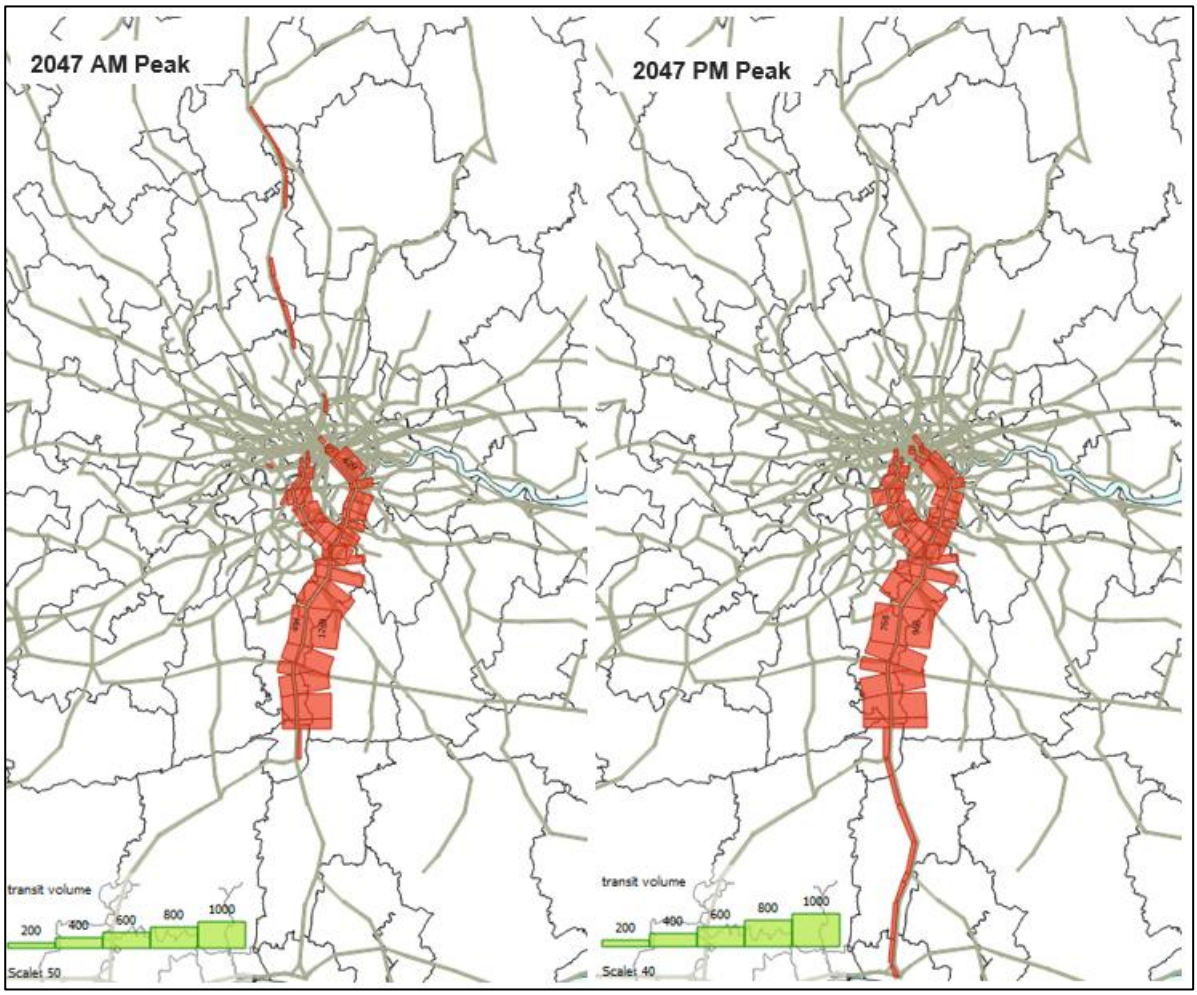
12.4.15 It should be noted that the model is deemed appropriate for assessment for the PEIR and associated impacts of the development at Gatwick Airport. However, detailed model statistics are being reviewed by stakeholders and the strategic transport model will go through a series of updates in terms of calibration and validation to feed into the final DCO submission.

Rail Network

12.4.16 The public transport study area for the PEIR is based on strategic modelling and the PLANET model for the rail network. The study area for public transport also includes the effects of growth on crowding in Gatwick Station.

12.4.17 Gatwick's primary area of effect on the rail network is on services which pass through Gatwick Airport railway station. Diagram 12.4.4 shows the net flow change in the 2047 AM and PM peak periods (0700-0900 and 1600-1800) between the future baseline and with the Project. The change in bandwidth indicates the growth with Project. These plots show that the largest potential change in demand will be on the Brighton Main Line, in particular north of Gatwick, and then on into London Victoria and London Bridge. Note, that London Underground, Docklands Light Railway, the Elizabeth Line and other cross-London rail connections are included in the model. However, the change in flows with Project is less than 200 passengers in two hours on these lines and so these are not shown in Diagram 12.4.4.

Diagram 12.4.4: 2047 flow change between future baseline and With Project - AM and PM peak periods (0700-0900 and 1600-1800)



12.4.18 The study area for rail is therefore proposed to focus on the highest line loadings, between Gatwick Airport and London. The hours of assessment are:

- AM Peak – two-hour period between 0700 and 0900
- PM Peak – two-hour period between 1600 and 1800

12.4.19 The existing rail models (PLANET South and Railplan) have a three hour AM peak 0700-1000, but Department for Transport cordon counts show that 0900-1000 is significantly quieter than 0700-0800 and 0800-0900. For this reason, a tighter two-hour period is preferred. The busiest single hour at London Bridge and Victoria is 0800-0900; these services pass through Gatwick between 0720 and 0820. The AM rail period for the rail model is 0700-0900, encompassing the peaks at both Gatwick and London.

Methodology for Baseline Studies

Desk Study

12.4.20 Desk studies have been undertaken to inform the baseline conditions and update GAL's assessment and modelling tools to test the likely effects of the Project. The desk studies and data sources include the following.

- WebTRIS data – Highways England have an extensive count database for the SRN available online, which measures the volume of traffic on the network and provides continuous outputs.
- Department for Transport manual classified counts (MCCs).
- Traffic Count Data – an extensive primary data collection exercise was undertaken in both 2016 and 2019 which has been supplemented by secondary data sources from the local authorities.
- CAA data – from Gatwick air passenger surveys 2014-2018 was used to provide the database of air passenger details.
- Employee Survey – behavioural survey data was obtained from the Gatwick Employee and Employment survey which GAL undertakes periodically, the data available for this work was collected in 2016.
- Trip Distribution Data - Citi Logik (CL) were commissioned in 2016 to provide travel demand data for an area within the south east of England. In the context of GAL, a broad specification to the data was included to ensure that temporal and geographic characteristics of travel through the area could be identified.
- OS Open Roads data set to inform network attributes such as link length and road type.
- Rail timetable information has been obtained from the Network Rail schedule database in CIF (Common Interface File) format. This provides the arrival and departure time at each station for each train service.
- Underground, Tramlink and Docklands Light Railway (DLR) timetables have been obtained from the Transport for London website.
- The national General Transit Feed Specification dataset, which includes published timetable/schedule data for all public transport services across the UK.
- ORR station entries and exits – ORR publishes annual estimates of the total numbers of passengers entering, exiting and interchanging at each UK rail station.
- West Sussex Cycle Journey Planner to establish existing national, regional and local cycle routes.

12.4.21 GAL already holds a number of models generated as part of the Airports Commission consideration of additional runway capacity in the UK.

- M25 Dartford Free Flow Crossing Model (SATURN) developed by Highways England and endorsed by the Department for Transport for that process.
- PLANET South model as provided by the Department for Transport, outputs of which were shared with Network Rail.

12.4.22 These models provide a reference for the current assessment with Project.

Site-Specific Surveys

12.4.23 Surveys of the site were also undertaken to inform the assessment. A summary of the surveys undertaken is provided in Table 12.4.2 and further details are included in the PTAR (Appendix 12.9.1). A number of these surveys were undertaken in 2016 in order to capture a representative data set, including mobile phone data capture, collected over a two month period and comprising upwards of 2.5 million devices and 170 million events per day for the busiest days giving a wealth of information to inform transport modelling. Given industrial action by Southern as well as rail disruption associated with works at London Bridge from late 2016 to 2018, construction of M23 Smart Motorway from 2018 to 2020 and now the Covid-19 pandemic, it has not been possible to update this base position with a more recent dataset. .

Table 12.4.2: Summary of Site-Specific Surveys

Survey	Methodology
Traffic counts (2016)	Following on from the Airports Commission process and in anticipation of future projects, Gatwick undertook an extensive data collection exercise in 2016 which included: ▪ automatic traffic counts; ▪ manual classified link and turning counts; and ▪ automatic number plate recognition (ANPR) counts.
INRIX (2016)	Journey time data collected which represents an estimated road speed at different times of the day based on real time GPS feeds.
Mobile phone-based survey (2016)	A comprehensive mobile phone-based survey of origin and destination movements in the area surrounding Gatwick Airport across an area equivalent to the Gatwick Diamond.
Employee survey (2016)	Gatwick Employer and Travel to Work Survey 2016 comprising data on number of employees, temporary or permanent, postcodes, shift patterns, mode of travel to work, travel preferences and influences.
Airport-related cargo and goods movement data (2019)	Data provided by Gatwick Airport. Currently being considered in the context of 2019 INRIX data.

12.4.24 In terms of Gatwick passenger data, three sources have been used to inform the assessment.

- Civil Aviation Authority data provides a national survey of departing passengers at each UK airport to understand passenger characteristics and trends. Access to this dataset has been secured through GAL.
- Profiler data - Survey of departing passengers to support further analysis on passenger trends and characteristics. This dataset which is collected by GAL is similar to the Civil Aviation Authority data; however, Profiler has a substantially higher response rate to the postcode question. This is important for developing air passenger matrices and more detail on parking location.
- A profile of arriving and departing passengers, by year, month, day and hour for 2016 to 2018 from passenger counts for each flight as collected by GAL.

12.4.25 All the data and surveys used are considered sufficiently up to date to inform PEIR in accordance with best practice and Department for Transport TAG guidance (2013b), noting that construction of M23 Smart Motorways and rail disruption means that data collection since late 2016 would have been affected. The final ES for the development consent application will use updated data where available and as appropriate.

Assessment Criteria and Assignment of Significance

12.4.26 The significance of an effect is determined by the sensitivity of a receptor and the magnitude of an impact. This section describes the criteria applied in this chapter to characterise the sensitivity of receptors and magnitude of potential impacts. The terms used to define magnitude and sensitivity are based on and have been adapted from those used in IEMA (2004) and DMRB (Highways England *et al*., 2020), which is described in further detail in Chapter 6: Approach to Environmental Assessment.

Receptor Sensitivity/Value

12.4.27 The receptors considered in the assessment are:

- pedestrians and cyclists using roadside footways or off-road cycle routes;
- bus and coach passengers;
- rail passengers; and
- car drivers and passengers, including taxis and private hire vehicles, servicing vehicles.

12.4.28 Effects on public rights of way (including their use by walkers, cyclists and equestrians) are considered within Chapter 18: Agricultural Land Use and Recreation.

12.4.29 The criteria to assess receptor sensitivity is shown in Table 12.4.3.

Table 12.4.3: Sensitivity Criteria

Sensitivity	Definition
Very High	Those receptors with greatest sensitivity due to site-specific characteristics which make them particularly sensitive to changes in traffic flows (eg community with high incidence of mobility impairment requiring to crossroads to access essential facilities).
High	Receptors of high sensitivity to traffic flows (eg schools, colleges, playgrounds, accident black spots, urban / residential roads without footways that are used by pedestrians).
Medium	Receptors of medium sensitivity to traffic flows (eg congested junctions, doctors' surgeries, hospitals, shopping areas with roadside frontage, roads with narrow footways un-segregated cycle ways, community centres, parks, recreation facilities, retirement homes).
Low	Receptors with some sensitivity to traffic flows (eg places of worship, public open space, nature conservation areas, listed buildings, tourist attractions and residential areas with adequate footway provision).
Negligible	Receptors with low sensitivity to traffic flows and those sufficiently distance from affected roads and junctions.

12.4.30 The links being assessed within the study area are shown in Diagram 12.4.1. Each link has been assessed for sensitivity (in terms of pedestrians and cyclists) and these are set out in Appendix 12.9.2. The sensitivities of other road users are considered separately as outlined below.

12.4.31 For pedestrian and cyclist sensitivity, there are roads within the study area which are not on desire lines (direct routes which pedestrians and cyclists prefer to take to reach their destination) and have no footway or dedicated cycle provision. The sensitivity of these roads is considered to be negligible. The sensitivity is considered to be low if there are footways and/or cycle provision, and medium if there are residential frontages or particularly sensitive receptors, eg a hospital. A table is provided in Appendix 12.9.2 which sets out the sensitivity considered for each link within the study area.

12.4.32 For car drivers and passengers, the sensitivity on roads is considered to be low if there is generally no congestion and is not considered to be particularly sensitive to changes in traffic. The sensitivity is considered to be medium if there is sometimes congestion or if the road is of strategic importance, and therefore more sensitive to changes in traffic. For the purposes of assessing driver delay, only junctions where the volume of traffic is over 85% of the capacity of the junction and are becoming congested (ie with a Volume to Capacity or V/C ratio of over 85%) are considered to focus on potential significant effects. Car drivers and passengers are considered to have medium sensitivity where V/C ratios are 85% or higher.

12.4.33 In terms of crowding on rail services, rail passengers on busy train services will be more sensitive to increases in demand. Rail services where seats are available to passengers are considered to have low sensitivity. Rail services where passenger demand exceeds the number of seats but is within standing capacity are considered to have medium sensitivity. Rail services where passenger demand exceeds standing capacity are considered to have high sensitivity.

12.4.34 For station crowding, higher crowding means a lower standard of passenger comfort and a reduction in crowding means improved passenger comfort. Paragraphs 12.4.53 to 12.4.56 sets out the Level of Service (LoS) methodology, which ranges from LoS A to F (see Diagram 12.4.5). LoS A represents free flow and LoS F a complete breakdown in circulation. LoS C is typically used for designing transport interchanges. For the purposes of this assessment, passengers experiencing LoS C or better are considered to have a low sensitivity to increases in crowding, those experiencing LoS D are considered to have medium sensitivity and those experiencing LoS E or F are considered to have high sensitivity.

Magnitude of Impact

12.4.35 The magnitude of impact has taken into account the impact duration which is defined as follows for the purposes of this assessment:

- short term: a period of months, up to one year;
- medium term: a period of more than one year, up to five years; and
- long term: a period of greater than five years.

12.4.36 The criteria used to assess the magnitude of impact, are described below in Table 12.4.4. For some assessment topics, the magnitude of impact is specially defined in the IEMA guidance (2004) and these are set out in the following sections for each impact.

Table 12.4.4: Impact Magnitude Criteria

Magnitude of Impact	Definition
High	Changes which are likely to be perceptible and which would significantly change conditions which would otherwise prevail to the extent that it would significantly affect travel behaviour.
Medium	Changes which are likely to be perceptible and which would materially change conditions which would otherwise prevail to the extent that it may affect travel behaviour to a measurable degree.
Low	Changes which are likely to be perceptible but not the extent that they would materially change conditions which would otherwise prevail.
Negligible	Changes which are just perceptible.
No Change	No loss or alteration of characteristics, features or elements; no observable impact in either direction.

Severance

12.4.37 IEMA (2004) defines severance as the perceived divisions that can occur within a community when it becomes separated by a traffic route. Severance may result from the difficulty of crossing a heavily trafficked road or a physical barrier created by the road itself.

12.4.38 The assessment thresholds are based on changes in traffic flows as set out in the IEMA guidelines (2004) as set out in Table 12.4.5. IEMA (2004) states that full regard should be given to specific local conditions, such as whether crossing facilities are provided. Peak hour two-way traffic flows have been used to assess severance.

Table 12.4.5: Magnitude of Impact for Severance

Magnitude of Impact - Severance	Changes in Traffic Flow
High	More than 90%
Medium	60% to 90%
Low	30% to 60%
Negligible	0% to 30%
No Change	No change in traffic flows

12.4.39 The DMRB (Highways England *et al*., 2020) defines community severance as the extent to which members of communities are able (or not able) to move around their community and access services / facilities. This DMRB assessment has been undertaken separately and is contained in Chapter 18: Agricultural Land Use and Recreation.

12.4.40 For the purposes of reporting, highway flows for links within the study area are contained in Appendix 12.9.2, with those which have a magnitude of impact of low, medium and high assessed within this chapter to focus on potential significant effects on people.

Driver Delay

12.4.41 The IEMA guidance (2004) on assessing driver delay requires the use of modelling packages. Driver delay can occur where the Project results in additional vehicular movements at junctions and along highway links. Increased pedestrian movements at crossing points could also have an impact on driver delay.

12.4.42 Detailed highway modelling assessment is contained in the PTAR. The IEMA guidance (2004) does not define the magnitude of impact for driver delay. For the purposes of this report, ratios expressing the total traffic volume with respect to its total available capacity (Volume to Capacity) has been used to assess the level of congestion. The approach to the magnitude of impact for driver delay is set out in Table 12.4.6. It is proposed that only junctions with a V/C of over 85% are considered in this assessment, to focus on potential significant effects.

Table 12.4.6: Magnitude of Impact for Driver Delay

Magnitude of Impact – Driver Delay	Volume to Capacity (V/C)			
	<85%	85 - 92%	92 - 99%	99% or more
<2% change in Congestion Indicator	Negligible	Negligible	Negligible	Negligible
2-5% change in Congestion Indicator	Negligible	Low	Low	Medium
Between 5-10% change in Congestion Indicator	Negligible	Low	Medium	High
>10% change in Congestion Indicator	Negligible	Medium	High	High

Pedestrian and Cyclist Delay

12.4.43 IEMA (2004) states that changes in volume, composition or speed of traffic may affect the ability of pedestrians to cross roads. The IEMA guidelines do not prescribe any quantitative criteria for the assessment of pedestrian delay. Instead, professional judgement has been used to determine the magnitude of pedestrian and cyclist delays, taking into account pedestrian and cycle routes and pedestrian crossing facilities.

Pedestrian and Cyclist Amenity

12.4.44 IEMA (2004) defines pedestrian amenity as the relative pleasantness of a journey. It is affected by traffic flow, traffic composition, and footway width/separation from traffic. The IEMA guidelines suggest that the threshold for judging the significance of changes in pedestrian amenity would be where the traffic flow is doubled.

12.4.45 The perception of traffic can also affect fear and intimidation for pedestrians and cyclists. IEMA (2004) identifies the impact of fear and intimidation is dependent on the volume of traffic, the HGV composition, the proximity of traffic to people, or the level of protection caused by factors such as narrow pavement widths. There are no commonly agreed thresholds for fear and intimidation. Professional judgement has been used to determine the magnitude of impact on pedestrian and

cyclist amenity, taking into account the degree of hazard, the changes in traffic flows and also the provision of pedestrian and cyclist facilities.

Accidents and Safety

12.4.46 IEMA (2004) references the use of professional judgement to assess the accident and safety impacts. Implications of local circumstances, or factors which may elevate or lessen risks of accidents, such as junction conflicts, would be considered.

12.4.47 Changes in traffic flows and highway design could influence the risk of accidents, but embedded surface access improvements are proposed, and any design changes to the highway network will be subject to a Road Safety Audit. Therefore, professional judgement has been used to consider the risks in terms of accidents and safety, taking into account changes in traffic flows, existing accident clusters, and embedded design mitigation measures.

Hazardous Loads

12.4.48 IEMA (2004) recognises that some developments may involve the transportation of dangerous or hazardous loads (such as gases, inflammable liquids, toxic substances, or radioactive material) by road. The Project is not expected to generate hazardous loads but changes to highway design and temporary diversion routes during the construction period could affect the existing transportation of hazardous loads on the public highway. Any effects will be assessed as part of the ES and, for the purposes of the PEIR, it is assumed that temporary diversions will be safe and clearly signposted. The exact temporary routes are not known yet but will be assessed in the final ES.

Rail Network and Rail Users

12.4.49 No IEMA or DMRB guidance exists for the measurement of public transport amenity. For the purposes of this assessment, crowding assessments on rail services to and from Gatwick, and crowding at Gatwick Airport station have been used to indicate public transport amenity.

Rail Crowding

12.4.50 The EMME platform has been used for the public transport modelling for Gatwick. EMME is a well-established and reliable software model for public transport assignment, including modelling impacts of in-vehicle crowding on passenger route choice. PLANET South has been used for the assessment of rail effects. Further information is contained in the PTAR.

12.4.51 Line loading data, as well as information on seating and standing capacity by line, have been used to determine crowding. If all passengers have a seat, this is assumed to be a more comfortable journey with low levels of crowding. More passengers standing indicates a reduction in space and less comfortable journeys and higher crowding. The following train services have been assessed:

- North Downs Line (NDL)
- Gatwick Express (GX)
- Fast services to/from London Victoria
- Stopping services to/from London Victoria
- Fast services to/from London Bridge
- Stopping services to/from London Bridge

12.4.52 The approach to assessing rail crowding is firstly to assess the percentage increase in line loadings as the result of the Project at stations between Gatwick Airport and London. The seating capacity of the lines has then been reviewed. If number of passengers exceeds the number of seats, a further assessment is undertaken on the standing capacity in terms of percentage occupied. The assessment is undertaken for both inbound and outbound direction for the AM and PM peak periods. The peak periods are averaged over two hours (AM peak 0700-0900, PM peak 1600-1900), and the line loadings shown are on departure from each station during this period. Based on the two hour assessment period, the criteria considered in determining the magnitude of impact for rail crowding is shown in Table 12.4.7.

Table 12.4.7: Magnitude of Impact for Rail Crowding

Magnitude of Impact – Rail Crowding	Rail Crowding - Change in Occupied Standing Capacity
High	Over 30%
Medium	10% to 30%
Low	0 to 10%
Negligible	No change, or the number of seats exceeds the number of passengers, ie all passengers can be seated.
No Change	

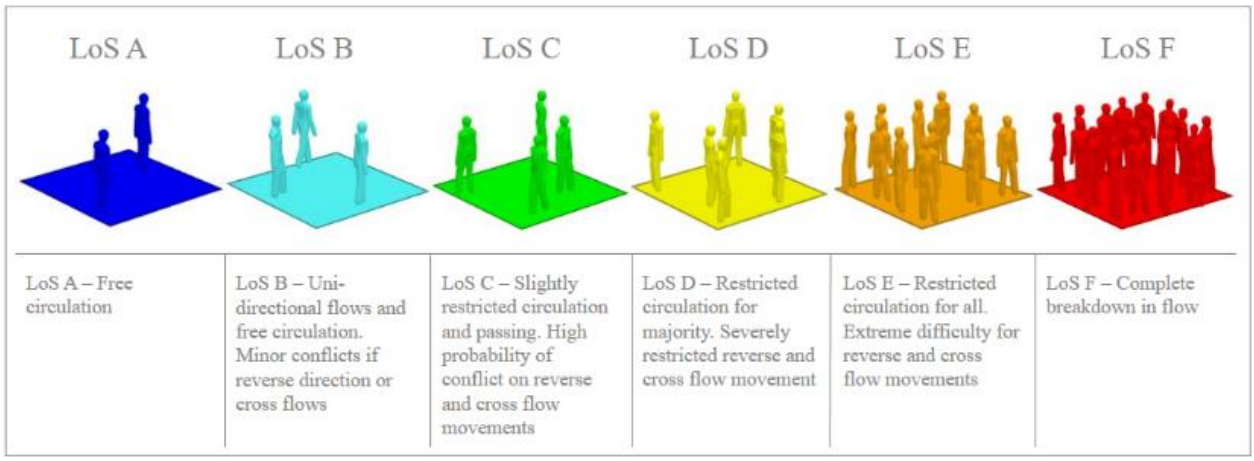
Railway Station Crowding

12.4.53 The assessment of crowding in Gatwick Airport railway station has been modelled in Legion using the calibrated and validated model developed by Network Rail for AM and PM peak periods (07:00-10:00 and 16:00-19:00). The model was developed as part of the Network Rail/Costain Gatwick Station Project and provided to GAL in March 2019. Details on trip generation and mode shares are contained in PTAR (Appendix 12.9.1).

12.4.54 In the station, higher crowding means a lower standard of passenger comfort and a reduction in crowding means improved passenger comfort. Crowding has been assessed in line with Station Capacity Planning Guidance (Network Rail, 2016). The assessment of crowding is based on the Fruin Level of Service criteria. Level of Service (LoS) is used to describe pedestrian movement, relating density of pedestrians and flow rates for walkways and circulation areas, stairs and in queues, with LoS A representing free flow and LoS F a complete breakdown in circulation.

12.4.55 LoS C is typically used for designing transport interchanges as it provides a balance between congestion, design and operations. Network Rail therefore typically recommends LoS C or better for the design of new stations and station enhancements. LoS D can be considered acceptable in peak conditions at existing stations for short durations or where flows are predominantly one-way.

Diagram 12.4.5: Levels of Service Ranges



12.4.56 Changes in station crowding level have been used to estimate the magnitude of impact of the Project. Where there is no change in Level of Service experienced between the baseline conditions and the 'with Project' scenarios, the impact is considered to be negligible. Changes in Level of Service by one category (ie a change from LoS C to LoS D) is defined as a low to medium impact. Changes in LoS by two categories (such as between LoS C and LoS E) are defined as a medium to high impact.

Table 12.4.8: Magnitude of Impact for Public Transport Amenity

Magnitude of Impact – Public Transport Amenity	Level of Service in the railway station
High	A change in two Levels of Service.
Medium	
Low	A change in one Level of Service.
Negligible	No change in Level of Service experienced in the station.
No Change	

Other Public Transport Services and Users

12.4.57 A bus and coach network model has been developed in EMME software and complements the rail modelling undertaken in PLANET South to create the overarching Gatwick public transport model.

12.4.58 The public transport model includes all bus and coach services used to access the airport by air passengers and employees. The information for bus/coach route coding has been obtained through discussions with operators, data from Gatwick and other publicly available data sources.

12.4.59 Given the adaptability of bus and coach provision, it is expected that operators will increase services to meet demand. For many local authority areas, the change in bus or coach trips is very small and would not require a change in bus or coach frequency. However, gradual increases in capacity could be expected to be required over time with a sustained increase in demand. Therefore it is not considered necessary to model crowding on bus and coach services explicitly within the modelling framework. The assessment will include service frequency as a measure of

public transport amenity. More information is contained in the PTAR. Table 12.4.9 illustrates the coaches per day assumed for each assessment year with and without Project.

Table 12.4.9: Coaches per Day

Terminus	2029		2032		2047	
	Future Baseline	With Project	Future Baseline	With Project	Future Baseline	With Project
Bognor Regis	2	2	2	3	2	3
Brighton	21	23	22	27	25	30
Bristol*	7	8	8	9	9	10
Cardiff*	9	10	10	12	11	13
Chatham[4]	0	11	0	11	0	11
Chingford	16	17	16	20	19	22
Derby/Nottingham*	12	13	12	15	14	17
Heathrow*	5	5	5	6	5	7
Northampton*	9	10	10	12	11	13
Norwich*	11	12	12	14	13	16
Oxford	27	28	27	33	31	37
Park Royal	12	13	12	15	14	16
Poole	11	11	11	13	12	15
Rayleigh	16	17	16	20	19	22
Southend	16	17	16	20	19	22
Swansea*	13	14	14	17	16	19
Victoria	61	65	62	76	71	85
Worthing	4	4	4	5	5	6
Wolverhampton*	8	9	8	10	9	11
LGW-LHR total	75	80	77	94	88	105

* indicates via Heathrow

[1] New Kent service proposed with Project (see 12.6.51 onwards)

Significance of Effect

12.4.60 The significance of the effect upon traffic and transport has been determined by taking into account the sensitivity of the receptor and the magnitude of the impact. The method employed for this assessment is presented in Table 12.4.10. Where a range of significance levels are presented, the final assessment for each effect has been based upon expert judgement.

12.4.61 In all cases, the evaluation of receptor sensitivity, impact magnitude, and significance of effect has been informed by professional judgement and is underpinned by narrative to explain the conclusions reached.

[4] New Kent service proposed with Project (see 12.6.51 onwards

12.4.62 For the purpose of this assessment, any effects with a significance level of minor or less are not considered to be significant in terms of the EIA Regulations.

Table 12.4.10: Assessment Matrix

Sensitivity	Magnitude of Impact				
	No change	Negligible	Low	Medium	High
Negligible	No change	Negligible	Negligible or Minor	Negligible or Minor	Minor
Low	No change	Negligible or Minor	Negligible or Minor	Minor	Minor or Moderate
Medium	No change	Negligible or Minor	Minor	Moderate	Moderate or Major
High	No change	Minor	Minor or Moderate	Moderate or Major	Major or Substantial
Very High	No change	Minor	Moderate or Major	Major or Substantial	Substantial

12.4.63 A description of the significance levels is provided in the bullets below:

- Substantial: Only adverse effects are normally assigned this level of significance. These effects are generally, but not exclusively, associated with changes of international, national or regional importance that are likely to suffer a most damaging impact. However, a major change of local importance may also enter this category.
- Major: These beneficial or adverse effects are considered to be very important considerations .
- Moderate: These beneficial or adverse effects may be important . The cumulative effects of such factors may lead to an increase in the overall effect on a particular resource or receptor.
- Minor: These beneficial or adverse effects may be raised as local factors. They may be important in enhancing the subsequent design of the project.
- Negligible: No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

12.5. Assumptions and Limitations of the Assessment

12.5.1 This PEIR sets out the preliminary assessment findings. Further detailed work will be undertaken throughout the EIA process and presented within the ES, which will accompany the application for development consent. The assessment currently includes assumptions on the following which may be further refined throughout the EIA process:

- passenger forecasts, based on a scenario with no Heathrow third runway;
- mode shares and travel patterns of future users of the Project based on strategic modelling work;
- the distribution of trips on the network;
- committed developments; and
- TEMPRO growth to indicate background growth associated with cumulative schemes.

12.5.2 Strategic multi-modal modelling has been undertaken which informed mode shares and the resulting traffic flows and rail loadings used in this assessment. Further information on passenger forecasts, trip generation and mode shares are contained in the PTAR (Appendix 12.9.1).

12.5.3 This assessment uses passenger forecasts provided by ICF and assumes business-as-usual travel behaviour based on a 2016 baseline. The 2016 dataset has been extrapolated to 2018, for the purposes of understanding the likely effects from the Project for air quality and carbon where required. Given industrial action by Southern as well as rail disruption associated with works at London Bridge from late 2016 to 2018, construction of M23 Smart Motorways from 2018 to 2020 and now the Covid-19 pandemic, it has not been possible to update this base position with a more recent dataset (see paragraphs 12.4.23 and 12.6.1 to 12.6.4). It should be noted that the Project is assessed against future baseline years, rather than against 2016.

12.5.4 The assessment of traffic impacts includes consideration of the Project construction phases.

- Airfield Construction – The peak airport construction assessment is based on information provided by GAL's construction team for the core airfield works required to enable operation of the Project (opening in 2029). Airfield construction has been modelled using a future baseline 2029 highway network as a robust case of baseline traffic flows. Some residual activity related to build out will continue beyond 2029 but remaining activity is similar to business-as-usual levels, which include the everyday construction and maintenance works associated with normal airport operations. This is already accounted for in the traffic data used for the modelling and the assessment.
- Highway Construction - A separate assessment has been undertaken for the construction of the surface access improvements . The surface access improvements are required to be in place after the northern runway becomes operational and by 2032. This construction scenario has therefore been modelled using the 2029 with Project demand, reflecting operational demand growth associated with the northern runway, on a modified highway network, reflecting the construction of the Project surface access improvements works.

12.5.5 Further work will be undertaken by GAL's construction team on the detailed programme and improvement measures, which will inform the application for development consent.

12.5.6 At this stage further analysis is required to confirm the need for and location of a Construction Logistics Consolidation Centre. The Code of Construction Practice notes that a Consolidation Centre could be on an existing site or one that is permitted for such use already. As the details are yet to be confirmed, for the purposes of the assessments in this chapter, it is assumed that a Construction Logistics Consolidation Centre is not provided. This is a conservative assumption as the consolidation centre should reduce trips to and from the construction sites on airport. Should one be provided, this could be explored as further mitigation as part of the final ES if necessary.

12.5.7 The impact of growth on rail passenger flows through Gatwick Airport Railway Station uses Network Rail's simulation model built for the station upgrade project using Legion software. The station modelling undertaken in Legion includes all airport-related rail users and assumes a proportion of visitors (meeter-greeters, well-wishers) as well as commuter use of Gatwick Airport railway station.

12.5.8 The PEIR assessment uses the best information available at the time of writing. Where possible, a robust approach has been taken to minimise the risk of under reporting effects. Where assumptions have been made, these are stated where appropriate in the assessment.

12.6. Baseline Environment

Existing Baseline

12.6.1 The baseline assessment year for the PEIR is 2018, based on a 2016 calibrated and validated traffic model providing base flows which have been extrapolated to describe relevant 2018 conditions for the air quality and carbon assessments.

12.6.2 The Covid-19 pandemic had a very severe impact on the global aviation industry in 2020. Gatwick, along with all other UK airports, experienced a significant reduction in passenger traffic levels as a result of both Government-imposed restrictions on air travel and reduced passenger demand driven by low consumer confidence.

12.6.3 Passenger numbers at Gatwick decreased from over 46.6 million passengers per annum (mppa) in 2019 to 10.2 mppa in 2020. It is expected that Government travel restrictions will continue to have an impact on passenger demand and traffic levels throughout 2021, but that by the end of 2021 traffic levels will be starting to recover.

12.6.4 It is anticipated that demand at Gatwick will return to pre-Covid levels by the mid-2020s.

Mode Share and Travel Patterns

12.6.5 The passenger mode share information has been taken from Gatwick 2018 Airport Surface Access Strategy and are based 2017 Civil Aviation Authority data, while the latest staff mode share information has been taken from the 2016 Gatwick Employer and Travel to Work Survey which are not expected to have significantly changed for the 2018 baseline year. A more limited Staff Travel Survey was undertaken in 2019, providing information on attitudes to travel choices but without sufficient data to replace the mode share and distribution from 2016. The mode shares are shown in Table 12.6.1.

Table 12.6.1: Staff and Passenger Mode Shares

Mode	Passenger	Staff
Rail	39%	12%
Bus/Coach	6%	16%
Walk/Cycle	0%	3%
Car Driver	39%	52%
Car Share	0%	8%
Taxi	15%	0%
Car rental	1%	0%
Company	0%	6%
Other	0%	3%
Total	**100%**	**100%**

12.6.6 Table 12.6.1 shows that Gatwick achieved an annual average public transport mode share for passengers of over 45%, with 39% of passengers coming to the airport by rail and almost 6% by bus and coach in 2018. Around 55% of passengers access the airport by car-based modes, with almost 40% of passengers coming by private car, either as pick-up and drop-off trips to terminal forecourts or to park their car at the airport.

12.6.7 Ongoing CAA surveys to first quarter 2020 (prior to the impact of Covid-19) show a continuing improvement in public transport mode share year-on-year, up to 47.4% in 2019 and 47.8% in the 12 months to March 2020.

12.6.8 It should be noted that there is significant quarter-by-quarter variation in passenger mode share, which is an important consideration for the assessment. The assessment has been undertaken to test a busy summer day at the Airport which is when public transport mode share is lower owing to the higher proportion of UK outbound leisure passengers. Public transport mode share for the busiest summer months in 2019 was 43.4% as compared to the yearly average of 47.4%.

12.6.9 The staff travel survey in 2016 showed that the sustainable mode share for employees was 31% excluding car share and company travel (shared transport provided by individual airlines and other on-airport employers).

Highway Network

12.6.10 Gatwick Airport can be directly accessed from the national strategic road network via the M23 motorway, which runs north-south adjacent to the airport. Junction 9 of the M23 is the main access point with an onward link of motorway (M23 Spur) to Junction 9a at the airport's South Terminal roundabout. Highways England's M23 Smart Motorway project was completed in Summer 2020. This has added additional running lane capacity to the strategic network serving Gatwick at peak times.

12.6.11 The typical journey time from Gatwick Airport to the M25 via the M23 is less than 10 minutes. From the M25, there is access to the wider UK strategic road network.

12.6.12 The A23, which runs parallel to the M23, continues north beyond the M25 into London via Croydon and Brixton to the West End and the City. It connects south London and Croydon, through Redhill then Horley and Gatwick Airport, through Crawley and providing a connection to the south through Pease Pottage to Brighton.

12.6.13 South of Gatwick, the M23/A23 continues as a strategic highway corridor from London to Brighton on the South Coast. Brighton is approximately 30 to 45 minutes from the airport by road in the off-peak and peak periods respectively. The A23 connects with the A272 and A27 east - west routes, placing the whole of the South Coast between Southampton and Folkestone within approximately 1 hour and 20 minutes of the airport.

12.6.14 The M25 is busy and can be slow-moving and congested at peak times. Highways England is committed to improving conditions on the M25, through a variety of committed enhancements as well as the M25 South West Quadrant study, which is looking at ways to enhance capacity from Junctions 7 (for the M23) to 16 (for the M40) of M25. In addition, the proposed Lower Thames Crossing linking Essex and Kent will provide additional cross-river capacity east of London, relieving congestion on the M25 at the existing Dartford Crossing and improving accessibility to South Coast ports.

12.6.15 Surface transport facilities within the airport boundary are made up of on-airport roads, forecourts and car parks, including facilities for coaches, taxis and car rental companies. GAL has recently completed works to improve the North Terminal Forecourt and has introduced forecourt charging at both terminals. There are currently around 46,700 car parking spaces 'on airport', including staff parking, and a further 21,200 authorised spaces 'off-airport'.

Accident Data

12.6.16 Department for Transport STATS19 road safety data (January 2021) has been examined for entire study area for the latest available three, full years (2017 to 2019). Accidents which occur within 30 miles of the study area links and adjacent junctions are shown in Diagram 12.6.1, and a more detailed plan around the airport is shown in Diagram 12.6.2.

Diagram 12.6.1: Three Year Accident Data within 30 m of a Study Area Link

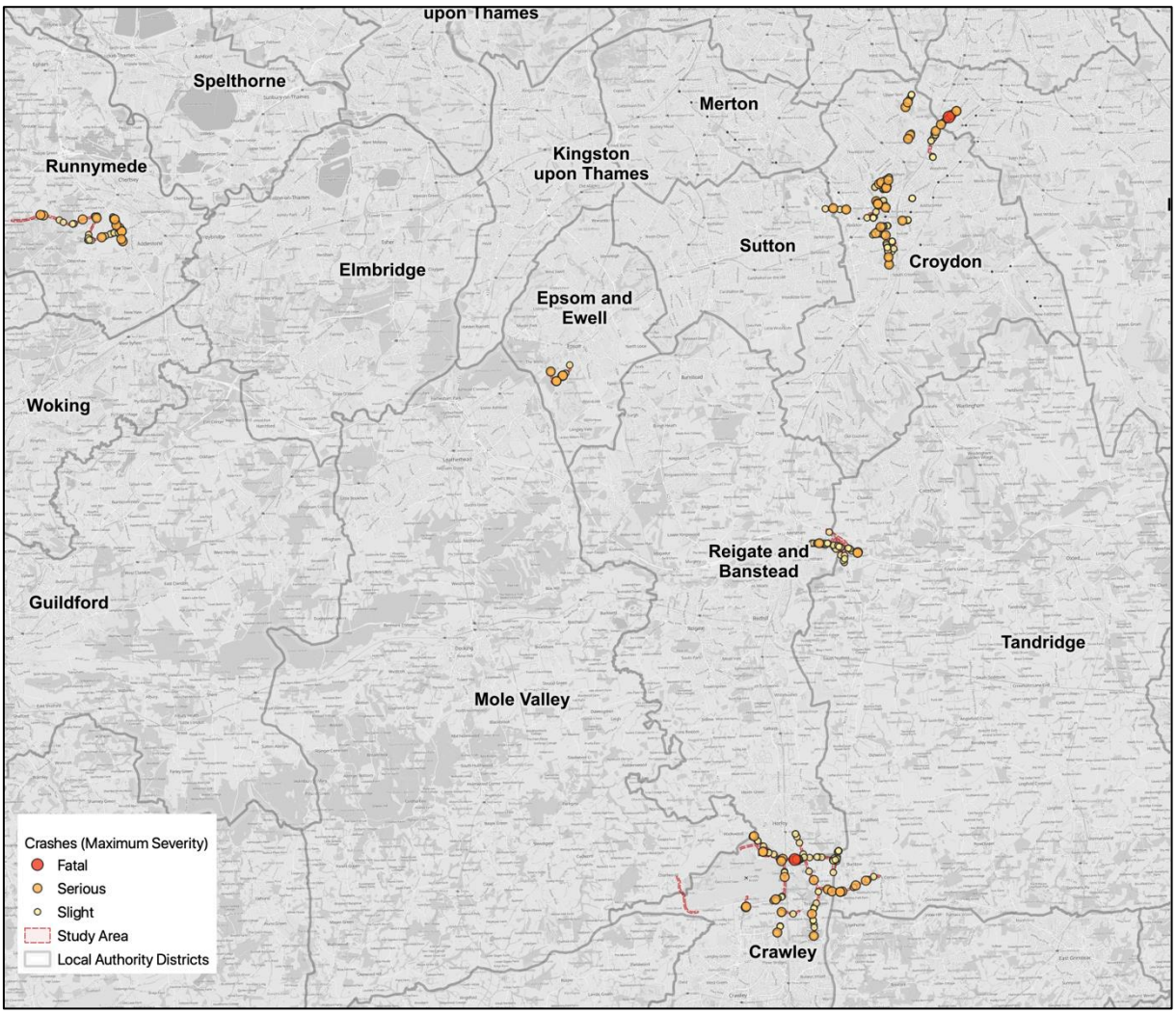
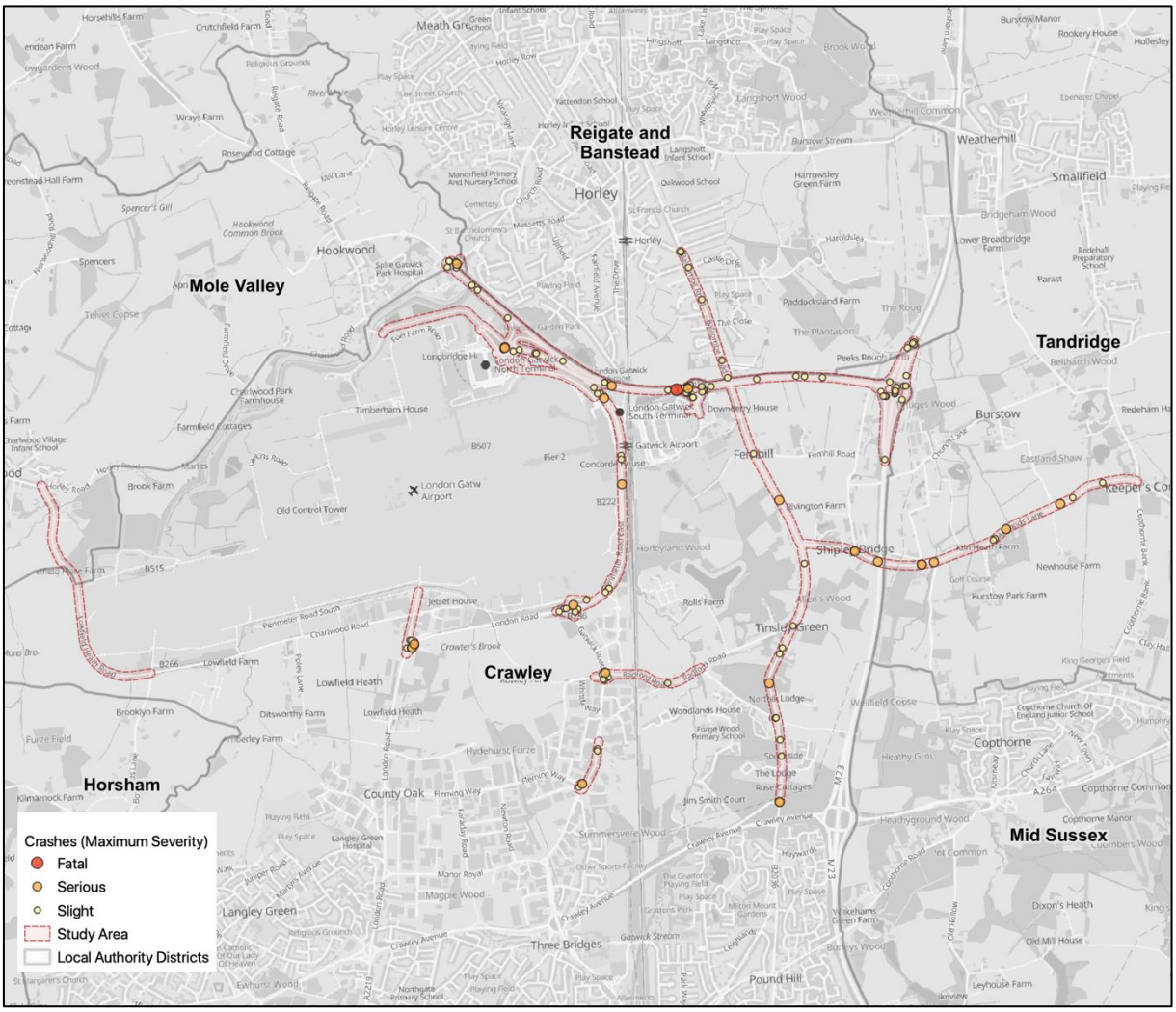


Diagram 12.6.2: Three Year Accident Data within Proximity of the Airport



12.6.17 A summary of the average annual number of accidents by casualty severity is shown in Table 12.6.2. The accidents have also been considered in terms of local authorities.

Table 12.6.2: Accident Data

Location	Average Annual Number of Accidents, 2017 to 2019 **(Highest Recorded Injury Severity)**			
	Fatal	**Serious**	**Slight**	**Total**
Total accidents within 30 miles of a study area link	**0.6**	**24**	**140**	**164**
Bromley	0.3	1	5	6
Crawley	0.3	5	31	36
Croydon	-	8	63	71
Epsom and Ewell	-	2	2	4
Mole Valley	-	-	2	2
Reigate and Banstead	-	1	13	14
Runnymede	-	4	20	24
Sutton	-	-	1	1
Tandridge	-	3	3	6

12.6.18 The above shows that on average, 164 accidents per year occurred within the study area over the three year period. Of these, 140 accidents resulted in slight injuries (85%), 24 resulted in serious injuries (15%) and less than one on average over three years resulted in a fatality.

12.6.19 The location of the accidents suggest that junctions tend to have a higher risk of accidents because of potential conflicts and sensitivity to human error. Further assessments on the causation of accidents will be undertaken for the final EIA.

Rail

12.6.20 Gatwick Airport station has regular, direct daily services from over 120 stations. Over 800 stations are accessible with one interchange. There are four train operators serving Gatwick.

- **Gatwick Express** provides a direct service to London Victoria, departing every 15 minutes in peak periods and taking around 30 minutes. Four trains per hour extend to Brighton at peak times, with two trains per hour to Brighton in off peak periods.
- **Southern** provides services across London and the south east, including London Victoria, Clapham Junction, Brighton, Southampton, Ore, Eastbourne, Littlehampton, Bognor Regis and Portsmouth, as well as many local stations.
- **Thameslink** connects Gatwick to Brighton, Horsham and Three Bridges, as well as central London through London Bridge, St. Pancras International and Farringdon, and north to Bedford, Cambridge and Peterborough. Thameslink also provides a direct train to Luton Airport Parkway.
- **Great Western** runs an hourly service between Gatwick Airport and Reading, via Redhill, Reigate and Guildford.

12.6.21 The peak rail frequencies are provided below.

Table 12.6.3: Rail Frequencies to Gatwick (2020)

Operator/Service	Route	Peak Frequency
Gatwick Express	Gatwick Airport non-stop to London Victoria and Brighton	4 trains per hour
Southern – Brighton-London mainline	Gatwick Airport to Victoria via East Croydon and Clapham Junction	6 trains per hour
Thameslink – via London Bridge	Gatwick Airport to Bedford, Cambridge and Peterborough, via London Bridge	12 trains per hour
Great Western Railway – North Downs Line	Reading to Gatwick Airport via Redhill	1 train per hour

12.6.22 Gatwick is part of London's Oyster and contactless fare payment network. From Gatwick Airport station, it is possible to travel directly to the City of London via the Thameslink route (with interchange to Docklands from London Bridge station currently and at Farringdon on the Elizabeth Line (Crossrail) from 2022) and to the West End via London's Victoria station. These services also directly connect the airport to key interchanges at Croydon, Clapham Junction and Brighton.

Diagram 12.6.3: 2022 Rail Connectivity Map

12.6.23 Gatwick Airport therefore enjoys a very high level of rail connectivity, with 22 trains to and from central London in the morning peak hour (12 via London Bridge and 10 to London Victoria, of which four are Gatwick Express services).

12.6.24 Train services can be busy in peak periods in the peak direction, into London in the morning and towards Brighton and down towards the south coast in the evening. Trains towards London become increasingly busy further north of Gatwick in the morning peak, whereas trains out of London towards Brighton and the south are already busy north of Gatwick in the evening. However, with completion of the Thameslink Programme[5], train services between Gatwick and London provide nearly 14,000 seats per direction per hour, with room for nearly 30,000 passengers (including standing passengers) per direction per hour overall.

Bus and Coach

12.6.25 Gatwick is served by frequent bus and coach services at both North and South Terminals. The operators include Metrobus, National Express, Megabus, Oxford Bus Company, and easyBus. On average there are approximately 450 daily arrivals and 500 daily departures, offering services to destinations throughout the UK. An extract of the Metrobus network map is included in Figure 12.6.1.

Coach Services

12.6.26 The airport is served by a range of coach services, which complement and provide choice alongside the rail network. Many operators have invested in high quality vehicles, customer service improvements and effective marketing which have contributed to more attractive coach services.

12.6.27 Prior to the Covid-19 pandemic, National Express provided a number of direct services to and from Gatwick and the most popular routes are summarised in Table 12.6.4. Scheduled journey times for some services vary, especially across peak periods. Several of the long distance services stop either at Heathrow's Central Bus Station or at Victoria Coach Station allowing for onward connections to a wider range of destinations. All services are expected to resume as passenger demand at the airport returns.

Table 12.6.4: Popular National Express Coach Services to Gatwick

Routes	Service	Daily Services	Fastest Journey Time
London (Victoria, Vauxhall, Belmont, Banstead) to Gatwick	A3	37	33 mins to Sutton 1hr 50 mins to Victoria
Brighton to Gatwick	025, 026, 028, 029, 201, 206, 747	23	45 mins
Heathrow to Gatwick	200, 201, 210, 230, 707, 727, 747	81	1 hr 5 mins
Southampton to Gatwick	206	19	2 hrs 30 mins
Bournemouth to Gatwick	206	24	3 hrs 20 mins

[5] Rolling stock procurement and engineering works are complete but timetable changes are ongoing, with the last of these in summer 2019.

Routes	Service	Daily Services	Fastest Journey Time
Bristol to Gatwick	200, 201	19	3 hrs 25 mins
Birmingham to Gatwick	210	23	4 hrs
Newport to Gatwick	201	20	4 hrs 10 mins
Cardiff to Gatwick	201	22	4 hrs 35 mins
Swansea to Gatwick	201	15	5 hrs 40 mins

12.6.28 Other coach services include the following.

- Megabus routes serve Gatwick Airport from London (EB1) and Bristol (M25).
- Oxford Bus Company operate the Airline service between Gatwick and Oxford.
- easyBus provides a non-stop shuttle service between Gatwick and London (Fulham Road and Park Royal).

Local Bus Services

12.6.29 The majority of local bus services are provided by Metrobus and are used by airport staff and air passengers, as well as rail passengers accessing Gatwick Airport station.

12.6.30 Metrobus provides three 'Fastway' bus routes, calling at stops with shelters and real-time information displays and using a combination of bus lanes and guided busways to achieve bus priority over general traffic:

- 10: Bewbush – Broadfield – Crawley – Gatwick Airport;
- 20: Broadfield – Three Bridges – Gatwick Airport – Crawley – Horley; and
- 100: Maidenbower – Three Bridges – Crawley – Gatwick Airport – Horley – Redhill.

12.6.31 Metrobus also provides conventional routes:

- 4 and 5: County Oak – Crawley – Wakeham Green;
- 22: Holbury St Mary – Docking – Crawley;
- 200: Horsham – Gatwick Airport;
- 400: East Grinstead – Gatwick Airport – Redhill – Caterham; and
- 460: Epsom – Redhill – Crawley.

12.6.32 Particular emphasis has been placed on improving early morning services to the airport every day of the week in order to enable shift work staff to travel by bus. Gatwick has worked with Metrobus over many years to support and subsidise an extensive 24-hour, local bus network.

12.6.33 Figure 12.6.1 shows an extract of the Metrobus map to illustrate the coverage of the bus network. The map shows that there is good local bus coverage in the local areas of Crawley and Horley, extending west to Horsham and north to Redhill, which is reflected in the staff mode shares in these areas.

12.6.34 All buses are low floor, wheelchair accessible vehicles. Metrobus has introduced a range of ticketing options through the use of smart ticketing in the form of a smart Key Card. Airport staff are entitled to the Gatwick Travelcard key card which enables them to buy discounted bus travel. Staff can top up their smartcard online or at local travel shops.

12.6.35 All local buses are fitted with GPS technology, so users can find out how far away their bus is from any bus stop on the network using the internet or their smart phone. Many bus stops are also fitted with screens providing this information, as well as the exit from Gatwick Airport railway station. QR codes and NFC tags at bus stops, compatible with smart phone readers, make it even easier for users to get this information. Buses are also fitted with the 'Next Stop' screens which are very useful for infrequent travellers.

12.6.36 Gatwick has recently improved the customer experience for bus and coach services at the airport through provision of a new waiting area at South Terminal for passengers and installation of new fully accessible lifts connecting South Terminal, the railway station and the A23 southbound bus stops.

Other Bus and Coach Services

12.6.37 In common with other large airports, Gatwick also has a wide range of staff buses/coaches, licensed car park and car hire shuttle buses, hotel and guest house shuttle buses.

12.6.38 There are multiple hotel bus routes which operate on circular routes calling at both terminals in one direction. All routes operate seven days per week and include journeys in the early morning and late evening, in order to match demand from departing and arriving passengers.

12.6.39 In 2018, there were nearly 30 guest houses or hotels that operate services on request. The vehicles used are cars or van-based minibuses.

12.6.40 There were also large numbers of bus movements associated with off airport car parks.

12.6.41 In 2018, there were over 17,000 charter coach movements a year, peaking at almost 200 arrivals a day at the airport, which are operated by a large number of companies from across the UK.

Walking and Cycling

12.6.42 Very few passengers walk or cycle to Gatwick Airport. Based on the 2016 staff survey, around 3.0% of staff travel to Gatwick was by walking or cycling. Given the extent of the catchment area for walking and cycling trips, the focus is on staff travel from nearby residential areas, including Horley and Crawley.

12.6.43 Footways are provided along some of the internal forecourt roads where pedestrian movements are considered to be appropriate. Zebra crossings are provided along primary desire lines and signage is also provided to direct passengers to the terminals. In addition, GAL has introduced campus-wide advisory walking routes and maps for use by both passengers and employees. This includes a designated route between North Terminal and South Terminal.

12.6.44 There is also access to the airport via Povey Cross Bridge which is convenient for staff living around Charlwood and Hookwood, and from the Balcombe Road for residential areas to the east of the airport.

12.6.45 There are designated off-road walking routes towards Crawley and Horley which minimise conflicts with vehicles. Figure 12.6.2 shows the key designated pedestrian routes along with a 2 km catchment to indicate the areas likely to attract walking trips.

12.6.46 The cycling catchment is expected to be larger and Figure 12.6.3 shows the key designated cycling routes together with a 5 km catchment to indicate the areas likely to attract cycling trips.

12.6.47 National Cycle Route 21 (NCR21) provides a continuous route between Crawley, Gatwick, Horley, Reigate and London. Route 20 continues south towards Brighton and Route 21 continues east towards Royal Tunbridge Wells before heading south towards Eastbourne.

12.6.48 Within the vicinity of Gatwick, NCR21 provides an A23 crossing in the form of a subway, located to the north of the South Terminal. It crosses the railway lines along a ramped subway to the north of Horley station and along St Mary's Drive to the north of Three Bridges station.

12.6.49 Cyclists and pedestrians using NCR21 currently have to navigate a number of underpasses and overbridges and, while some sections of the route provide adequate lighting and priority off-road space, other sections are not well signed and require users to switch to on-road facilities.

12.6.50 Signal controlled pedestrian crossings are located on all four arms of the Longbridge Roundabout. There is also a marked cycle lane on the A23 merge from North Terminal Roundabout, which becomes narrow and indistinct before terminating close to where the River Mole passes under the highway. From here it joins an overgrown unpaved track, which diverts away from the A23. There are no other pedestrian or cycle facilities along the A23 or M23 to the east.

Airport Surface Access Strategy and Travel Plan

12.6.51 Gatwick is committed to low-carbon growth and its Decade of Change (Gatwick Airport Limited, 2021) strategy sets ambitious carbon reduction targets. These inform headline mode share targets established when generating this assessment for PEIR.

12.6.52 Mode share targets have been tested through the strategic modelling process to understand the impact of 'pull' and 'push' measures that are required to deliver these targets. 'Pull' measures include committed and planned transport improvements such as M23 Smart Motorways or planned upgrades on the Brighton-London main line. 'Push' measures include increasing forecourt or parking charges.

12.6.53 The final strategy in the application for development consent will be prepared in conjunction with Gatwick's Airport Transport Forum and in accordance with the Aviation Policy Framework guidance.

12.6.54 Gatwick intends to put forward a robust strategy which enhances Gatwick as a regional transport hub through improvements to rail, bus, and sustainable transport with challenging but achievable mode share targets established towards a lower carbon future.

12.6.55 In alignment with the ASAS, the Travel Plan will focus on specific interventions related to staff travel in particular. The Travel Plan will seek to promote sustainable and healthier modes of transport for staff and reduce travel to work by single occupancy car.

Targets

12.6.56 The Project ASAS and Travel Plan will be developed to deliver the growth associated with the northern runway safely and sustainably.

12.6.57 Headline targets proposed and common to both the future baseline and with Project ASAS are as follows.

- Achieve 60% sustainable mode share (public transport and active travel) for airport passengers by 2030 under the scrutiny of the Transport Forum Steering Group.
- Demonstrate clear progress towards reaching a rail mode share aspiration of 50% by 2030.
- Achieve 60% of staff journeys to work by sustainable modes (public transport, active travel modes and group travel provided by individual employers for their staff, referred to as 'company transport') and including other low emission travel initiatives (car share and zero emission vehicles) by 2030.

Actions

12.6.58 To achieve these targets, Gatwick Airport will undertake the following.

- Support committed highway and rail schemes, due for delivery before 2025, which are necessary for background growth and provide sufficient capacity for airport growth.
- Support Network Rail in providing additional rail network capacity delivered through committed and planned schemes through CP6 and CP7, which provide for commuter growth in the South East, but which will also accommodate additional airport demand at the target mode share.
- Deliver the station improvement project to provide sufficient capacity.
- Work with coach and bus operators to provide an appropriate increase in service frequency as well as new route offers to accommodate future growth.

12.6.59 The above actions have been included as "pull" measures or interventions in the strategic modelling as per below. In line with TAG, only those interventions which are near certain or more than likely to occur have been included in the modelling, as described more fully in the PTAR in Appendix 12.9.1.

- Road – all committed highway schemes including M23 Smart Motorways.
- Rail – rail assumptions to 2029 and beyond in future baseline and with Project include:
  - Elizabeth Line (Crossrail);
  - Thameslink frequency (24 trains per hour (tph));
  - extra peak Southern services enabled by improvements in East Croydon area (CARS);
  - North Downs Line increase from 2 tph to 3 tph (increase from 1 tph to 2 tph at Gatwick) with 1 tph extended from Reading to Oxford in 2047 only;
  - LUL Northern Line Extension;
  - LUL/DLR frequency and capacity improvements; and
  - Gatwick Airport Station Project, doubling the size of the station concourse, adding five new lifts and eight escalators to improve passenger flow, and widening two platforms to reduce crowding.
- Bus and coach – bus and coach assumptions to 2029 and beyond in future baseline:
  - updates to coach frequencies in proportion to growth in air passengers.
- Further bus and coach enhancements with Project include:
  - new bus route hourly Uckfield to Gatwick via East Grinstead; and
  - new coach route two-hourly Chatham – Maidstone – Sevenoaks – Gatwick.

12.6.60 GAL is also considering the following.

- Increasing forecourt charging to reduce the proportion of “Kiss and Fly” trips (those incurring both drop off and pick up journeys). Note, free drop-off and pick-up will be provided in long-stay to ensure equitable access from those locations not well-served by public transport.
- Increasing parking charges to encourage use of more sustainable modes.

12.6.61 The above actions have been included as “push” measures in the strategic modelling as follows.

- Car ‘Kiss and Fly’ and parking – in 2029 the forecourt charge is assumed to rise to £9.50 (in 2021 money) and to £11.50 in 2032 and 2047. Charges for use of both GAL managed and off-site car parks are assumed to rise by 30% in real terms from 2016 Base to 2029 and by 40% to 2032 and 2047.

12.6.62 The above measures are included in the strategic modelling used to inform this EIA chapter as well as to provide traffic data for noise and air quality modelling. The measures lead to an increase in passenger public transport mode share from around 45% prior to the Covid-19 pandemic up to 54% and 56% between 2029 and 2047 for both the future baseline and with Project. Whilst not at the 60% target, this increase in public transport mode share for air passengers is significant and notable given the growth in passenger numbers in the future baseline and with the Project. The assessment shows that mitigating the effects of the Project can be achieved by the interventions tested and are not reliant on the ASAS targets being met. However, Gatwick aspires to a more sustainable, lower emission mode share so will continue to work towards these targets with stakeholders and consider additional interventions prior to the application for development consent and subject to model testing.

Future Baseline

12.6.63 These sections describe predicted future baseline scenarios, based on anticipated passenger growth in the absence of the Project. Chapter 4 sets out the future Airport context and the projects which are proposed or have already been consented and would proceed in the short term, in the absence of the Project. These include airport passenger throughput, freight demand, additional car parking and Gatwick Airport station improvements which are all included in the future baseline. Minor improvements (signalisation and local widening) to South and North Terminal Roundabouts form part of the demand input and network structure of the strategic modelling.

12.6.64 Background traffic is based on the latest TEMPRO growth factors with adjustments to consider cumulative development. In London, data from TfL was adopted to modify the assumptions in London for growth in travel demand. More information on growth rates are contained in the PTAR.

2024-2029

12.6.65 Peak airport construction impacts are expected between 2024 and 2029. For the purposes of this assessment, 2029 traffic flows have been used to test the robustness of the highway network to cope with the additional construction traffic associated with the Project. This is a robust case as 2029 has the highest background traffic flows in the period 2024 to 2029.

12.6.66 The committed rail upgrade works at Gatwick Airport station will be in place in this future baseline scenario. Works commenced in 2020 and completion is expected in September 2023. The works involve a larger concourse, five new lifts, eight new escalators, four new stairways and widening for two existing platforms to reduce overcrowding and improve accessibility. The works are

expected to reduce train delays caused by platform overcrowding and congestion, while also improving passenger experience by providing easier connections to other destinations.

12.6.67 Gatwick is looking to upgrade South and North Terminal roundabouts through local widening and signalisation. These improvements are identified in Gatwick's Capital Investment Programme and are scheduled to be in place by the mid-2020s.

12.6.68 As part of the CIP works, Gatwick has proposed improvements to walking and cycling. This includes a new pedestrian and cycle route between the Longbridge Roundabout and North Terminal by Staff Car Park Y including a new pedestrian and cycle bridge over the River Mole. Other pedestrian and cycle improvements are proposed at the North Terminal roundabout and along Perimeter Road North between North and South Terminal.

12.6.69 No other committed infrastructure changes within the study area are expected for public transport or highway network.

2029

12.6.70 The 2029 Gatwick passenger demand per annum is forecast to be 57.3 million. Trip generation associated with the 2029 future baseline is provided in the PTAR (Appendix 12.9.1).

12.6.71 There are internal improvements works proposed within Gatwick Airport which are expected to be in place by 2029. These include the opening of new multi-storey car parks at North Terminal (MSCP7) and South Terminal (MSCP4) and use of robotics technology within existing long stay parking areas. These improvements will result in approximately an additional 6,750 spaces.

12.6.72 A number of rail, bus and coach improvements are anticipated to 2029, as per Section 12.6.59.

Interim Assessment Year: 2032

12.6.73 The 2032 Gatwick passenger demand per annum is forecast to be 59.4 million. Trip generation associated with the 2032 future baseline is provided in the PTAR (Appendix 12.9.1). No additional changes are assumed by 2032.

Design Year: 2047

12.6.74 The North Downs Line has 1 tph extended from Reading to Oxford in 2047. No other committed changes within the study area are assumed for walking, cycling, public transport or highway network.

12.6.75 The 2047 Gatwick passenger demand per annum is forecast to be 67.2 million. Trip generation associated with the 2047 future baseline is provided in the PTAR (Appendix 12.9.1).

12.7. Key Project Parameters

12.7.1 The assessment has been based on the parameters identified within Chapter 5: Project Description.

12.7.2 Table 12.7.1 below identifies the key parameters relevant to this assessment. Where options exist, the maximum design scenario selected is the one having the potential to result in the greatest effect on an identified receptor or receptor group. Effects of greater adverse significance

are not predicted to arise should any other option identified in Chapter 5 be taken forward in the final design of the Project.

12.7.3 The traffic assessment has been used to inform the assessments contained in Chapter 13: Air Quality and Chapter 14: Noise and Vibration.

Table 12.7.1: Maximum Design Scenarios

Potential Impact	Maximum Design Scenario	Justification
Initial Construction Phase: 2024-2029		
Increase in construction traffic. Temporary traffic and pedestrian diversions. Rail improvements.	Peak construction traffic assessed on top of 2029 background traffic growth (highest background traffic between the period 2024-2029). Construction traffic assessed.	2029 is the latest possible year prior to opening of the Project.
First Full Year of Opening: 2029		
Increase in passenger numbers.	Passenger Air Transport Movements based on forecast data.	The increase in the number of passengers will increase trips on the transport network.
Interim Assessment Year: 2032		
Increase in passenger numbers.	Passenger Air Transport Movements based on forecast data.	The increase in the number of passengers will increase trips on the transport network.
Design Year: 2047		
Increase in passenger numbers. Highway embedded mitigation.	A conservative assessment year reflecting a requirement under DMRB to assess the effects of a project 15 years after it has been completed.	Airport passenger and staff numbers are highest in 2047 and background traffic has increased on the network. This assessment year therefore provides a robust assessment and has been tested both without and with the Project.

12.8. Mitigation and Enhancement Measures Adopted as Part of the Project

12.8.1 A number of measures have been designed into the Project to reduce the potential for impacts on traffic and transport. These are listed in Table 12.8.1.

Table 12.8.1: Mitigation and Enhancement Measures

Measures Adopted as Part of the Project	Justification
Mitigation	
Surface Access Improvements	Preliminary traffic modelling shows that the surface access improvements will be required for the Project by 2032. Highway schemes have been developed and these are considered to form part of the Project design. Details of the highway improvement schemes being considered are contained in Chapter 5: Project Description. The surface access improvements works include changes to the North and South Terminal roundabouts and involve grade separated solutions. The Longbridge Roundabout also requires modification. These works are in addition to those identified in the future baseline 2024-2029. Modelling for PEIR indicates that mitigation is not required at M23 Junction 9.
Road Safety Audit	Highway design changes will be subject to Road Safety Audits where risks will be identified and remediation measures incorporated into the design where appropriate.
Travel Plan (construction and operation)	A Travel Plan is expected to be implemented to meet policy requirements. In particular, specific measures would target staff travel and encourage more sustainable travel patterns. This will be prepared for the development consent application once additional modelling work to inform the final assessment has been completed, including strategic multi-modal modelling to test specific interventions and how these affect mode share. A Travel Plan will also be implemented for construction workers. An Outline Construction Workforce Travel Plan will be prepared for the final ES which accompanies the application for development consent.
Temporary diversion routes during construction	Temporary diversion routes for traffic and pedestrians would be required during highway construction to maintain safety and therefore considered as part of the Project.
Construction Traffic Management Plan	As part of the construction works, a traffic management strategy would be put in place to minimise any negative environmental and community impacts. This would include the following. Measures to ensure the transport of construction materials and waste is managed as sustainably as possible, noting the impacts of transporting this by road, including the potential use of rail via facilities close to the airport, where this is appropriate and feasible. Scheduling of construction material and logistics traffic movements that need to come by road to use roads and highways outside of peak periods and to use designated routes into construction sites on the airport which are suitable for this type of traffic.

Measures Adopted as Part of the Project	Justification
	Delivery Management Zones to consolidate materials onto the least number of vehicles and to hold vehicles away from sensitive areas until deliveries are required. Encouraging/incentivising the highest possible public transport use for the construction workforce. Timing shift patterns such that those workers who do need to come by road to use roads and highways outside of peak periods. The strategy would be prepared in accordance with Transport for London guidance as set out in the PINS scoping comments. An Outline Construction Traffic Management Plan for Materials and Workforce will be prepared for the final ES which accompanies the application for development consent.
Monitoring	
Travel Plan monitoring	Ongoing monitoring of travel patterns are expected to ensure the success of the Travel Plan. Annual reporting will be undertaken to assess the performance against targets, in accordance with Airport NPS.
Surface access monitoring	Developing and carrying out monitoring of pedestrian, cyclist and traffic levels by mode in order to be able to respond to changes in demand. GAL will also monitor those surface access impacts as required by Highways England, Network Rail and the Department for Transport to demonstrate the successful mitigation of the effects of the Project.

12.8.2 The above mitigation measures are considered to be embedded into the Project and therefore relied upon for the purposes of this assessment. The mitigation measures are expected to be secured through the DCO process.

12.9. Assessment of Effects

12.9.1 For each year of assessment, the Traffic and Transport effects have been assessed as a comparison between future baseline and future baseline with Project, in line with guidance.

Initial Construction Phase: 2024-2029

12.9.2 During this phase, only airfield construction traffic would be generated by the Project. The proposal is for all construction vehicles to travel to and from the airport from via M23 Junction 9, and no restrictions are proposed for construction workers. Construction traffic would be monitored to ensure compliance with proposed routes, unless disruption causes these to be unavailable and signed diversionary routes provided.

12.9.3 The busiest month for construction vehicle activity is December 2026. However, December is a lower month for traffic on the highway network around the Airport and therefore the assessment has also considered other months during the peak months of construction activity in 2026 and 2027. Typically, the summer months, with high Airport activity and background traffic, are the

busiest on the network. Accordingly, the modelling and assessment considers the highest summer month which occurs in August 2027. The estimated hourly construction vehicle trip generation is 33 vehicles (HGVs and LGVs) in and out an hour along the M23 Spur, and 150 construction worker vehicles arriving in the AM1 peak hour and departing after the PM peak hour through August 2027. The modelling has tested the summer peak level of construction activity in August 2027 on 2029 baseline airport and background traffic levels to provide a robust assessment of potential construction impacts. The difference in traffic flows between 2027 and 2029 will be small (a few percent higher) and accordingly within the daily variation in any given year. Further information is contained in the PTAR (Appendix 12.9.1).

Severance

12.9.4 The peak hour highway flows for each link within the study area are contained in Appendix 12.9.2. For the purposes of reporting, only those which have a magnitude of impact of low, medium and high adverse or beneficial are assessed to focus on potential significant effects.

12.9.5 The data shows that no link within the study area is expected to experience changes in traffic of over 30% as the result of the Project during the airfield construction phase. Therefore, the magnitude of impact is considered to be negligible. The sensitivity of the links within the study area range from low to high, and the overall effect on severance is considered to be **negligible adverse**.

Driver Delay

12.9.6 The embedded mitigation measures as set out in Table 12.8.1 in the form of the Construction Traffic Management Plan will aim to reduce impact on journey times, particularly during the peak hours. The following diagram shows the magnitude of impact for driver delay for junctions where the V/C is over 85%.

Diagram 12.9.1: 2029 Construction Driver Delay Magnitude of Impact (all assessment time periods)

12.9.7 The above shows that most junctions (over 1,000) have no significant or low magnitude of impact in terms of delay. Car driver and passenger sensitivity is considered to be medium for junctions where the V/C is over 85%. For the junctions with no significant delays, the driver delay effect is **negligible**. For those with a low magnitude of impact, the driver delay is **minor adverse**.

12.9.8 There are two junctions in the Croydon area which are shown to have a medium magnitude of impact (the model area in Croydon is highly sensitive and is identifying capacity issues not related to the Project which require refinement for the final ES, see paragraph 12.4.13). For these junctions, the driver delay effect is considered to be **moderate adverse**. Further information is contained in the modelling Annex to the PTAR (Appendix 12.9.1) on overall journey times to consider driver delays in more detail. Work will be undertaken to verify model findings as well as to identify mitigation measures if required for the development consent. Any significant effects on driver delay will be mitigated and it is expected that the residual effect will reduce to minor adverse.

Pedestrian and Cyclist Delay

12.9.9 The peak construction traffic is not expected to interact with the main pedestrian and cyclist routes, which tend to be off-road. The change in traffic along pedestrian routes is also negligible, as set out in paragraph 12.9.5 and flow data in Appendix 12.9.2. The magnitude of impact is considered to be negligible, the sensitivity of receptors along the highway routes range from

negligible to medium. The overall effect on pedestrian and cycle delays are therefore expected to be **negligible adverse**.

Pedestrian and Cyclist Amenity

12.9.10 The suggested threshold for a significant effect on pedestrian and cyclist amenity is when the traffic flows have doubled. No roads within the study area are expected to meet this threshold during the construction period.

12.9.11 The traffic composition can also affect pedestrian and cyclist amenity. The traffic flows in Appendix 12.9.2 show that whilst there are links with increases in HGVs, with the highest increase in the number of HGVs along the M23 Spur and the A23, there are very small changes to the overall traffic composition. The highest increase in the percentage of HGVs (number of HGVs divided by total vehicle number) is 3% for all peak periods on the A23 London Road, to the south of Longbridge Roundabout (Link ID: 004). The predicted increase is from 4% to 7% in the AM1 and AM2 periods, 6% to 9% in the IP and 2% to 5% in the PM peak. The magnitude of this impact can be considered to be low. The sensitivity of the A23 London Road is considered to be low. The effect on pedestrian and cyclist amenity on the A23 London Road is therefore considered to be **minor adverse.**

12.9.12 For all the other roads, the predicted increase in the percentage of HGVs varies between -2% and 2%. The magnitude of impact is considered to be negligible. The sensitivity of the receptors along these links are considered to be negligible to high. The effect on pedestrian and cyclist amenity on all other roads is considered to be **negligible adverse.**

Accidents and Safety

12.9.13 Changes in traffic flows and highway design could influence the risk of accidents. No links are expected to experience a traffic increase of over 30%. Roads in study area identified as construction routes in particular, will experience a change in traffic composition, with a slightly higher proportion of HGVs compared to total traffic. Suitable measures to minimise the impact of construction vehicles would form part of the Construction Traffic Management Plan.

12.9.14 The magnitude of impact for accidents and safety is considered to be low. The sensitivity of receptors in terms of pedestrians and cyclists along construction routes are considered to be negligible to low. The effect on accidents and safety on pedestrians and cyclist is considered **negligible** along the construction routes.

12.9.15 The sensitivity of receptors in terms of car drivers and passengers is considered to be low to medium for both construction scenarios. The effect on accidents and safety on car drivers and passengers is considered **negligible adverse** along the construction routes, and no change on all other roads.

Hazardous Loads

12.9.16 It is expected that there would be some temporary diversions in place during construction as part of the Project but no significant changes are expected to the strategic highway network.

12.9.17 The magnitude of impact and sensitivity of receptors for hazardous loads are both considered to be negligible. The effect on transporting or routeing of hazardous loads is considered to be **negligible adverse.**

Effects on Public Transport Amenity

12.9.18 Changes in passenger crowding during this phase compared to the future baseline would be associated with Project construction workforce who travel to site by rail.

12.9.19 The number of construction workers travelling by rail is expected to be low. They will be travelling to Gatwick in the morning peak and this has been examined in terms of capacity by direction. From the north, this is the counter network peak direction and capacity modelling shows there is plenty of seating capacity available in 2029, including with incremental growth in passengers. Capacity modelling shows the rail service from the south also has seating capacity available (see paragraphs 12.9.43 onwards). In addition, measures within the Travel Plan for construction workers could include staggered shift start and end times to reduce peak period pressure as well as provision of bus services to park and ride sites and to specific towns and cities where construction workers come from.

12.9.20 The magnitude of impact is considered to be negligible and the sensitivity of receptors in terms of rail capacity is also considered to be low. The effect on rail crowding is therefore considered **negligible adverse.**

Further Mitigation and Future Monitoring

12.9.21 The assessment shows that although there will be increases in traffic flows as the result of construction, most of the effects are not significant. However, due to the issues identified in the strategic model in the Croydon area (see paragraph 12.4.13), two junctions in Croydon have been identified to have a moderate adverse effect in terms of driver delay. These changes do not relate to the airfield construction activities at Gatwick. Work will be undertaken to verify model findings as well as to identify mitigation measures if required for the development consent application. Any significant effects on driver delay will be mitigated and it is expected that the residual effect will be minor adverse. No further mitigation has been identified at this stage.

12.9.22 Construction activities are expected to be monitored as part of the Construction Traffic Management Plan. No further monitoring measures are currently proposed.

Significance of Effects

12.9.23 Potential significant effect identified in the Croydon area for driver delay. Again, this does not relate to the airfield construction activities at Gatwick. Further work will be undertaken to verify model findings as well as to identify mitigation measures if required. No other significant effects have been identified for this assessment year. No further mitigation or monitoring has been identified; therefore, the significance of effects would remain as presented above.

First Full Year of Opening: 2029

12.9.24 The annual passenger demand for 2029 is expected to increase from 57.3 million in the 2029 future baseline to 61.3 million with the Project. Trip generation associated with 2029 with the Project is provided in the PTAR (Appendix 12.9.1). The first full year of opening is considered to be when the main airport construction work is completed and the northern runway is operational.

12.9.25 A number of rail, bus and coach improvements are anticipated to 2029, as per Section 12.6.59.

12.9.26 The measures described above and included in the strategic model lead to an increase in passenger public transport mode share from around 45% prior to the Covid-19 pandemic up to

54% and 56% between 2029 and 2047. Whilst not at the 60% target set for 2030, this increase in public transport mode share for air passengers is significant and notable given the growth in passenger numbers with the Project.

Severance

12.9.27 The peak hour highway flows for the first full year of opening are contained in Appendix 12.9.2. For the purposes of reporting, only the links which have a magnitude of impact of low, medium and high adverse or beneficial are assessed in this section to focus on potential significant effects. These links and associated flows are shown in Table 12.9.1 for the future baseline, Table 12.9.2 for future baseline with Project. The net change in traffic flows are shown in Table 12.9.3.

12.9.28 The below shows that within the whole study area, from all of the links analysed in Appendix 12.9.2 during the first full year of opening, only two locations will experience more than 30% increase in traffic in the first full year of opening. Perimeter Road East at Gatwick Road Roundabout (Link ID: 13) and both sections of Old Brighton Road (Link IDs: 14 and 15) which are to the south of the airport and provide access to airport-related uses. The increases are due to changes in car parking in the with Project scenario in 2029, which are accessed from the south of the airport.

12.9.29 Perimeter Road East is considered to have low sensitivity in terms of pedestrians and cyclists. It is expected to experience an increase of around 35% in the AM1 and AM2 periods (low impact), with a lower increase of 19% in the IP (negligible impact). In the PM peak, a traffic reduction of 36% (low beneficial impact) is expected. Overall, the effect of severance for Perimeter Road East is considered **negligible adverse.**

12.9.30 Old Brighton Road South is considered to have low sensitivity in terms of pedestrians and cyclists. It experiences the highest percentage increase on the northern section between Charlwood Road and Perimeter Road South of around 70% in the AM1, AM2 and IP assessment periods (medium impact), and 259% in the PM peak periods (high impact). The southern section between Lowfield Heath Roundabout and Charlwood Road experiences an increase of 66% in the PM assessment period (medium impact). The future baseline flows for Old Brighton Road South are relatively low, and the magnitude of impact can be considered to be high. The effect of severance for Old Brighton South is therefore considered **minor adverse.**

12.9.31 All other links will have an increase of less than 30% and therefore the magnitude of impact on severance is considered to be negligible. The sensitivity of the highway links for pedestrians and cyclists range from negligible to high and the overall effect of severance is considered to be **minor adverse**.

Table 12.9.1: First Full Year of Opening 2029 Traffic Flows – Future Baseline

ID	Road	AM1			AM2			IP			PM		
		All vehs	HGV	% HGV	All vehs	HGV	% HGV	All vehs	HGV	% HGV	All vehs	HGV	% HGV
13	Perimeter Road East	821	77	9%	813	118	15%	893	151	17%	802	56	7%
14	Old Brighton Road South (South)	739	31	4%	810	35	4%	606	24	4%	682	9	1%
15	Old Brighton Road South (North)	314	16	5%	294	18	6%	225	16	7%	286	13	5%

Table 12.9.2: First Full Year of Opening 2029 Traffic Flows – Future Baseline with Project

ID	Road	AM1			AM2			IP			PM		
		All vehs	HGV	% HGV	All vehs	HGV	% HGV	All vehs	HGV	% HGV	All vehs	HGV	% HGV
13	Perimeter Road East	1116	87	8%	1073	125	12%	1067	156	15%	510	59	12%
14	Old Brighton Road South (South)	844	31	4%	886	36	4%	697	24	3%	1134	9	1%
15	Old Brighton Road South (North)	526	12	2%	509	19	4%	373	23	6%	1026	15	1%

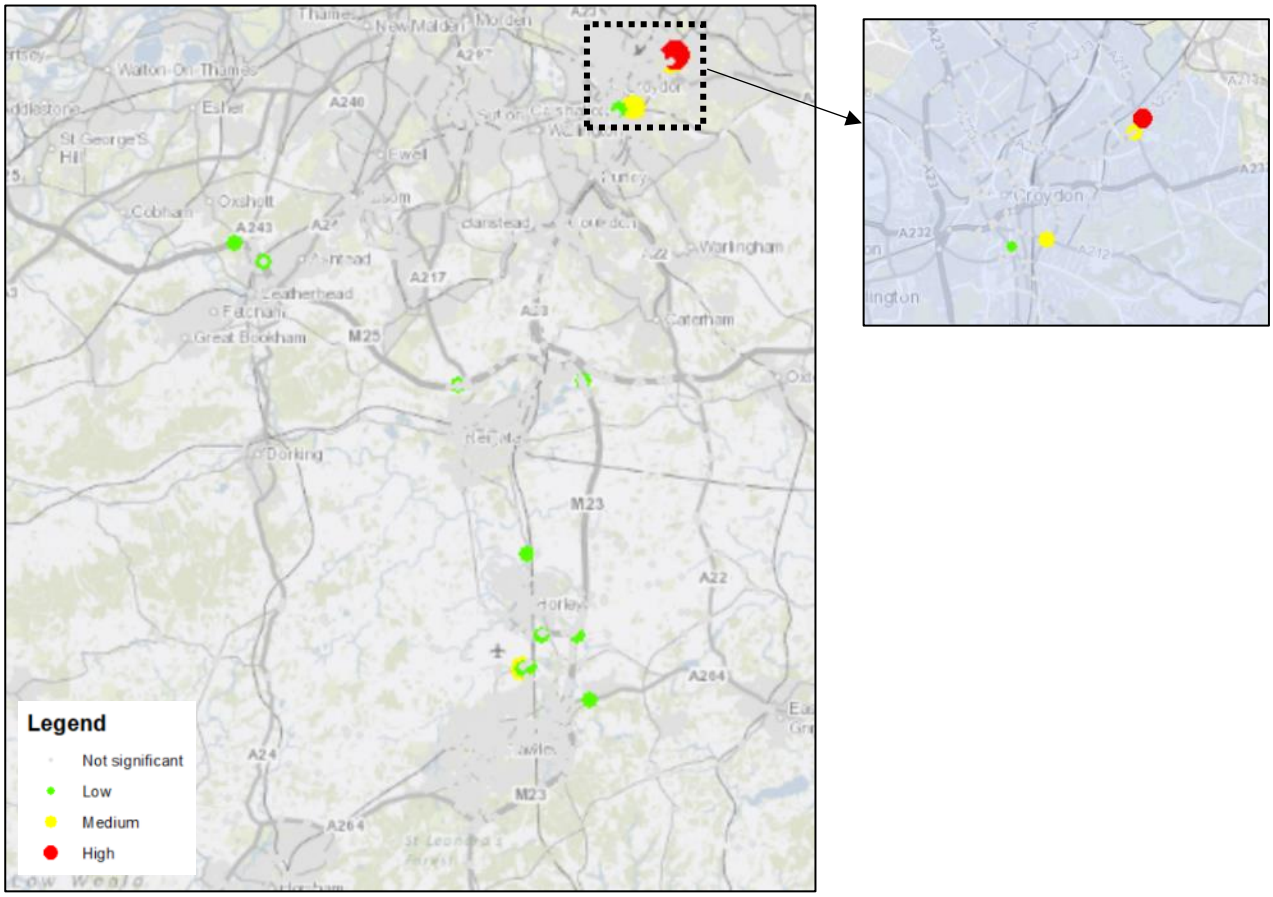
Table 12.9.3: First Full Year of Opening 2029 Traffic Flows – Net Change (Percentage Change in Brackets)

ID	Road	AM1			AM2			IP			PM		
		All vehs	HGV	% HGV	All vehs	HGV	% HGV	All vehs	HGV	% HGV	All vehs	HGV	% HGV
13	Perimeter Road East	295 (36%)	10 (13%)	-2% (-2%)	260 (32%)	7 (6%)	-3% (-3%)	174 (19%)	5 (3%)	-2% (-2%)	-292 (-36%)	3 (5%)	5% (5%)
14	Old Brighton Road South (South)	105 (14%)	0 (0%)	-1% (-1%)	76 (9%)	1 (3%)	0% (0%)	91 (15%)	0 (0%)	-1% (-1%)	452 (66%)	0 (0%)	-1% (-1%)
15	Old Brighton Road South (North)	212 (68%)	-4 (-25%)	-3% (-3%)	215 (73%)	1 (6%)	-2% (-2%)	148 (66%)	7 (44%)	-1% (-1%)	740 (259%)	2 (15%)	-3% (-3%)

Driver Delay

12.9.32 The following diagram shows the magnitude of impact for driver delay for junctions where the V/C is over 85%. The diagram shows driver delay for all time periods assessed and any overlaps in colours indicate different magnitudes of impact by time period. The highest magnitude of impact for each junction is considered.

Diagram 12.9.2: 2029 Driver Delay Magnitude of Impact (all assessment time periods)



12.9.33 The above shows that most junctions (over 1,000) have no significant or low magnitude of impact in terms of delay. Car driver and passenger sensitivity is considered to be medium for junctions where the V/C is over 85%. For the junctions with no significant delays, the driver delay effect is **negligible**. For those with a low magnitude of impact, the driver delay is **minor adverse**.

12.9.34 There are three junctions which are shown to have a medium magnitude of delay, one is located near Gatwick Airport and two are located in the Croydon area (as per paragraph 12.4.13 above, the model area in Croydon is highly sensitive and is identifying capacity issues not related to the Project which require refinement for the next stage). One junction is identified with a high magnitude of delay located in the Croydon area. For these junctions, the driver delay effect is considered to be **moderate adverse**. Further information is contained in the modelling annex to the PTAR on overall journey times to consider driver delays in more detail, and work will be undertaken to verify model findings as well as to identify mitigation measures if required for the development consent. Any significant effects on driver delay will be mitigated and it is expected that the residual effect will reduce to minor adverse.

Pedestrian and Cyclist Delay

12.9.35 The highest increase in traffic flows will be on Old Brighton Road South and Perimeter Road South. However, the traffic flows with Project of around 1,000 two-way flow per hour is not expected to lead to pedestrian or cyclist delay.

12.9.36 No significant changes to traffic flows on other links are expected and the magnitude of impact is considered to be negligible. The sensitivity of receptors along the highway routes range from negligible to high. The effect on pedestrian and cycle delays are expected to be **negligible adverse**.

Pedestrian and Cyclist Amenity

12.9.37 The threshold for an effect on pedestrian and cyclist amenity is when the traffic flows have doubled. Old Brighton Road South is expected to experience a doubling of traffic flows in the PM peak. This magnitude of impact can be considered to be medium, and with the sensitivity of the link for pedestrians and cyclists considered to be low, the effect of the Project on amenity along Old Brighton Road South can be considered to be **minor adverse** in the PM peak.

12.9.38 The traffic composition can also affect pedestrian and cyclist amenity. The highest increase in the percentage of HGVs (number of HGVs divided by total vehicle number) is 5% for the PM peak on Perimeter Road East. The predicted increase is from 7% to 12% and the magnitude of this impact can be considered to be low. The change in percentage HGV is largely due to the reduction in general traffic on this link in the PM peak with Project. The sensitivity of the Perimeter Road East is considered to be low and it is not considered to be a key pedestrian / cycle route. The effect of the Project on amenity along Perimeter Road East can be considered to be **negligible adverse** in the PM peak.

12.9.39 No other roads within study area will experience a doubling of traffic flows or noticeable changes to the traffic composition. The magnitude of impact is considered to be negligible and the sensitivity of receptors along the highway routes range from negligible to high. The overall effect on pedestrian and cyclist amenity is considered to be **negligible adverse**.

Accidents and Safety

12.9.40 The increases in the traffic flows are not expected to be significant and no changes to the highway layouts are proposed. The magnitude of impact is considered to be negligible. The sensitivity of receptors is negligible for high for pedestrians and cyclists, and low to medium for car drivers and passengers. The risk of accidents and safety for all road users is considered to be **negligible adverse**.

Hazardous Loads

12.9.41 No changes to traffic routes are proposed and therefore the effect on hazardous loads is considered to be **no change.**

Effects on Public Transport

12.9.42 To assess the effect of the Project on public transport, this section considers the impact on passenger crowding on rail services and in Gatwick Airport railway station. Public transport provision is as set out in 12.6.59.

Crowding on Rail Services

AM Peak (0700-0900)

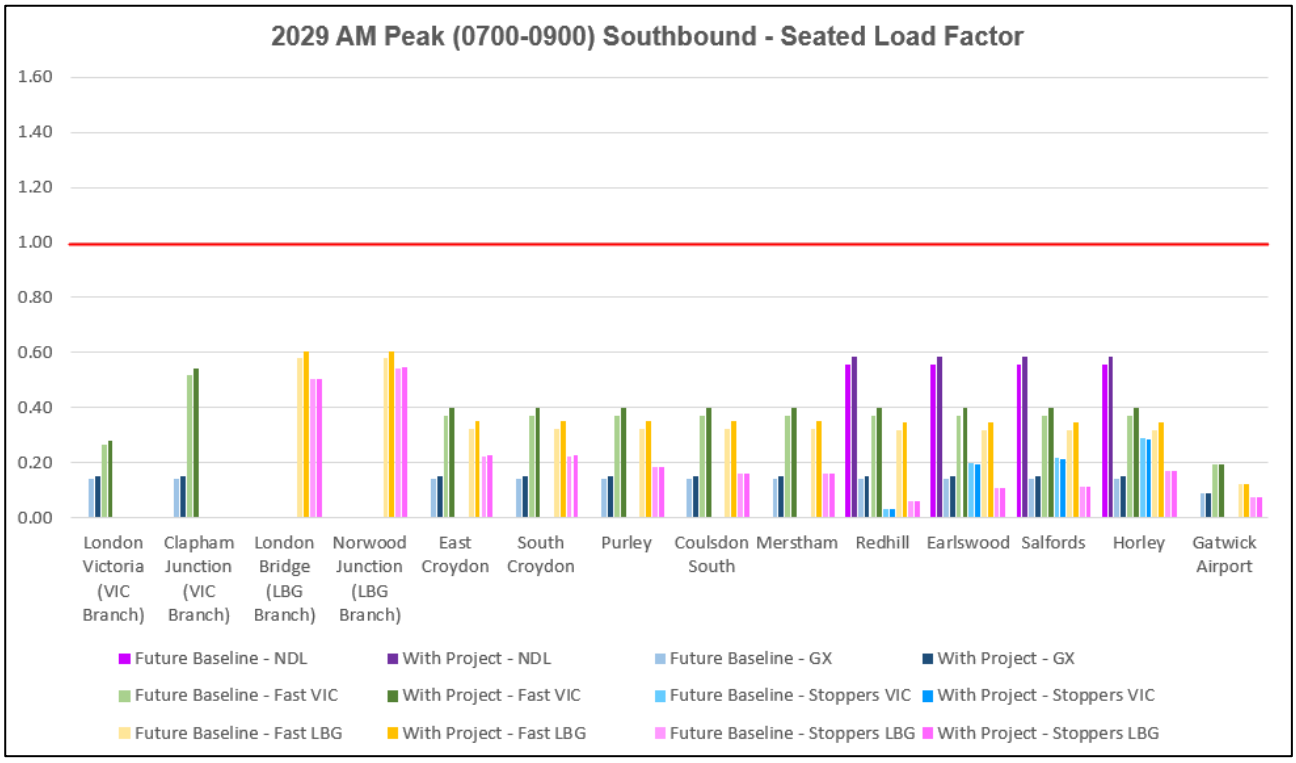
12.9.43 Crowding has been assessed based on line loading in both directions in the AM and PM peaks, and detailed data is contained in the PTAR (Appendix 12.9.1). In the AM peak, the highest increase in rail passengers is actually in the southbound direction, from London to Gatwick. This indicates that Gatwick growth means better use of contra-peak rail capacity and improves operational value for money. Table 12.9.4 provides a summary of the increase in line loading by station in the southbound direction.

12.9.44 The below table shows that on the rail services being assessed, the Project adds up to a total of around 550 passengers. Most of these passengers are expected on the fast train services from London Victoria and London Bridge. The increase in passengers represents an 8% increase in passengers on the fast services, and 9% on Gatwick Express. To assess the impact on crowding, Diagram 12.9.3 shows the seated load factor assessment.

Table 12.9.4: 2029 AM Southbound Line Loading Capacity Assessment

Station	2029 AM Peak Southbound (0700-0900)													
	Change in Line Loading on Departure							Percentage Change						
	NDL	GX	Fast VIC	Stoppers VIC	Fast LBG	Stoppers LBG	Total	NDL	GX	Fast VIC	Stoppers VIC	Fast LBG	Stoppers LBG	Total
London Victoria (VIC Branch)	-	53	65	-	-	-	**118**	-	9%	4%	-	-	-	**5%**
Clapham Junction (VIC Branch)	-	53	123	-	-	-	**176**	-	9%	4%	-	-	-	**5%**
London Bridge (LBG Branch)	-	-	-	-	239	13	**252**	-	-	-	-	4%	1%	**3%**
Norwood Junction (LBG Branch)	-	-	-	-	239	21	**260**	-	-	-	-	4%	1%	**3%**
East Croydon	-	53	176	-	293	5	**527**	-	9%	8%	-	8%	0%	**7%**
South Croydon	-	53	176	-	293	5	**527**	-	9%	8%	-	8%	0%	**7%**
Purley	-	53	176	-	293	5	**527**	-	9%	8%	-	8%	1%	**7%**
Coulsdon South	-	53	176	-	293	5	**527**	-	9%	8%	-	8%	1%	**7%**
Merstham	-	53	176	-	293	5	**527**	-	9%	8%	-	8%	1%	**7%**
Redhill	28	53	176	2	293	7	**559**	5%	9%	8%	5%	8%	2%	**8%**
Earlswood	28	53	176	-5	293	8	**553**	5%	9%	8%	-2%	8%	1%	**7%**
Salfords	28	53	176	-5	293	8	**553**	5%	9%	8%	-2%	8%	1%	**7%**
Horley	28	53	176	-5	293	8	**554**	5%	9%	8%	-1%	8%	1%	**7%**
Gatwick Airport	-	4	15	-	10	3	**33**	-	1%	1%	-	1%	1%	**1%**

Diagram 12.9.3: 2029 AM Southbound Seated Load Factor



12.9.45 The above diagram shows that the increase in passengers in the southbound direction will increase the seated load factor across all the lines assessed, but there is still seating available for passengers. The highest seated load factor is around 0.6, which means that four out of ten seats will be available.

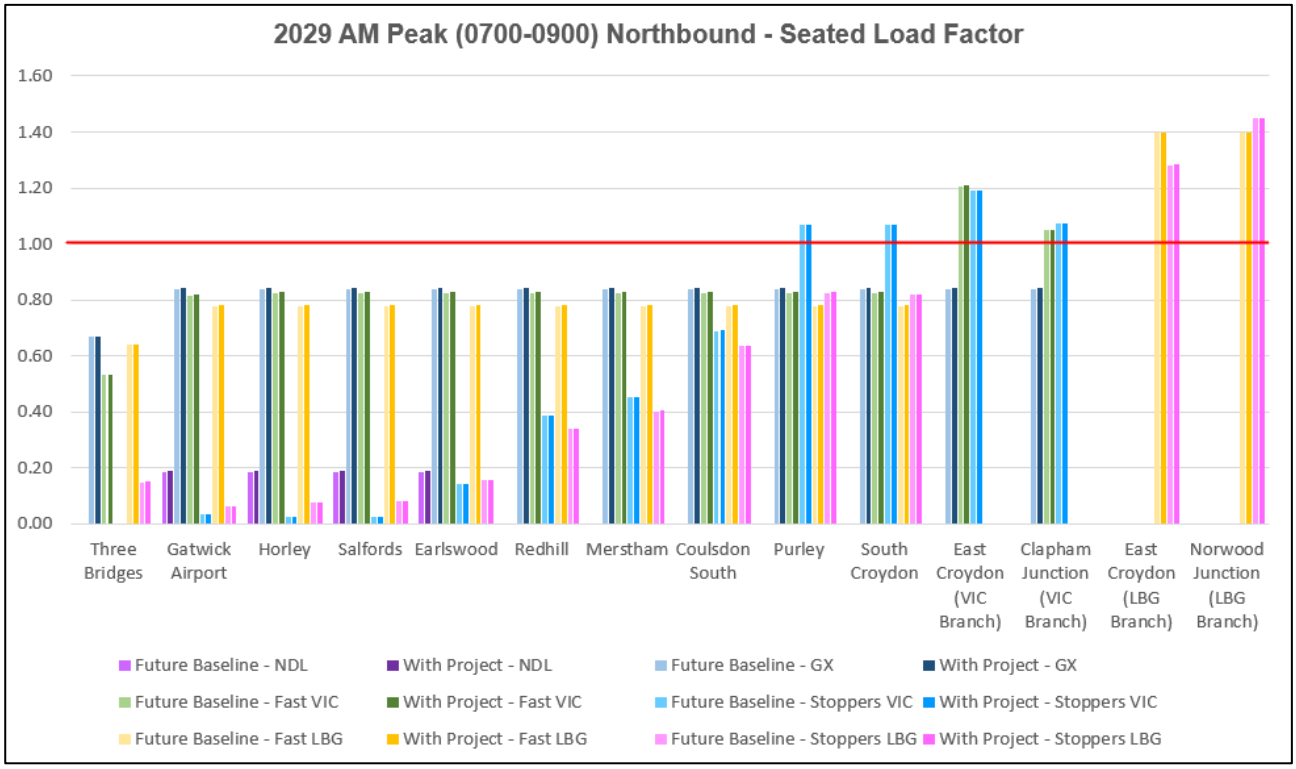
12.9.46 The line loading in the northbound direction has also been assessed. This is the peak rail network direction in the AM peak and Table 12.9.5 provides a summary of the increase in line loadings in this direction.

Table 12.9.5: 2029 AM Northbound Line Loading

Station	2029 AM Peak Northbound (0700-0900)													
	Change in Line Loading on Departure							Percentage Change						
	NDL	GX	Fast VIC	Stoppers VIC	Fast LBG	Stoppers LBG	Total	NDL	GX	Fast VIC	Stoppers VIC	Fast LBG	Stoppers LBG	Total
Three Bridges	-	3	9	-	18	8	**39**	-	0%	0%	-	0%	1%	**0%**
Gatwick Airport	6	23	41	1	60	10	**141**	3%	1%	1%	1%	1%	2%	**2%**
Horley	6	23	40	1	60	10	**139**	3%	1%	1%	1%	1%	2%	**2%**
Salfords	6	23	40	0	60	10	**139**	3%	1%	1%	1%	1%	2%	**2%**
Earlswood	6	23	40	3	60	13	**146**	3%	1%	1%	1%	1%	1%	**2%**
Redhill	-	23	40	4	60	7	**134**	-	1%	1%	0%	1%	0%	**2%**
Merstham	-	23	40	4	60	6	**134**	-	1%	1%	0%	1%	0%	**2%**
Coulsdon South	-	23	40	4	60	5	**133**	-	1%	1%	0%	1%	0%	**2%**
Purley	-	23	40	4	60	5	**132**	-	1%	1%	0%	1%	0%	**1%**
South Croydon	-	23	40	4	60	5	**132**	-	1%	1%	0%	1%	0%	**1%**
East Croydon (VIC Branch)	-	23	22	3	-	-	**47**	-	1%	0%	0%	-	-	**1%**
Clapham Junction (VIC Branch)	-	23	5	-1	-	-	**27**	-	1%	0%	0%	-	-	**1%**
East Croydon (LBG Branch)	-	-	-	-	15	13	**28**	-	-	-	-	0%	0%	**0%**
Norwood Junction (LBG Branch)	-	-	-	-	15	14	**29**	-	-	-	-	0%	0%	**0%**

12.9.47 The above table shows that the Project adds around 140 passengers to rail services in this direction, which represents an overall increase of 2%. Diagram 12.9.4 shows the seated load factor assessment for the AM peak northbound direction services.

Diagram 12.9.4: 2029 AM Northbound Seated Load Factor



12.9.48 The above diagram shows that between Three Bridges and Coulsdon South, there is seating available for all passengers. However, north of Purley, there are some services where the seating capacity is exceeded owing to background commuter flows into London. For these stations, standing capacity has been assessed which is shown in Table 12.9.6.

12.9.49 The standing capacity assessment shows the percentage occupied based on the capacity of each service. On average over the two-hour AM peak period, the highest percentage of standing capacity occupied is around 35%, which occurs north of East Croydon on both the London Victoria and London Bridge branches of the network. Whilst services north of East Croydon are therefore busy, the Project will not materially change congestion in 2029, with the highest increase in standing capacity occupied by Gatwick passengers being 0.6% north of East Croydon on fast services into London Victoria.

Table 12.9.6: 2029 AM Northbound Standing Capacity Assessment

Station	2029 AM Peak Northbound (0700-0900) - Percentage of Standing Capacity Occupied													
	Future Baseline 2029							Future Baseline 2029 + Project (% change)						
	NDL	GX	Fast VIC	Stoppers VIC	Fast LBG	Stoppers LBG	Total	NDL	GX	Fast VIC	Stoppers VIC	Fast LBG	Stoppers LBG	Total
Purley	-	0%	0%	12%	0%	0%	**1%**	-	0% (0.0%)	0% (0.0%)	12% (0.2%)	0% (0.0%)	0% (0.0%)	**1% (0.0%)**
South Croydon	-	0%	0%	12%	0%	0%	**1%**	-	0% (0.0%)	0% (0.0%)	12% (0.2%)	0% (0.0%)	0% (0.0%)	**1% (0.0%)**
East Croydon (VIC Branch)	-	0%	34%	32%	-	-	**5%**	-	0% (0.0%)	35% (0.6%)	32% (0.2%)	-	-	**5% (0.1%)**
Clapham Junction (VIC Branch)	-	0%	8%	13%	-	-	**1%**	-	0% (0.0%)	8% (0.1%)	13% (-0.1%)	-	-	**1% (0.0%)**
East Croydon (LBG Branch)	-	-	-	-	30%	17%	**18%**	-	-	-	-	30% (0.1%)	17% (0.1%)	**18% (0.1%)**
Norwood Junction (LBG Branch)	-	-	-	-	30%	27%	**21%**	-	-	-	-	30% (0.1%)	28% (0.1%)	**21% (0.1%)**

Table 12.9.7: 2029 PM Northbound Line Loading Capacity Assessment

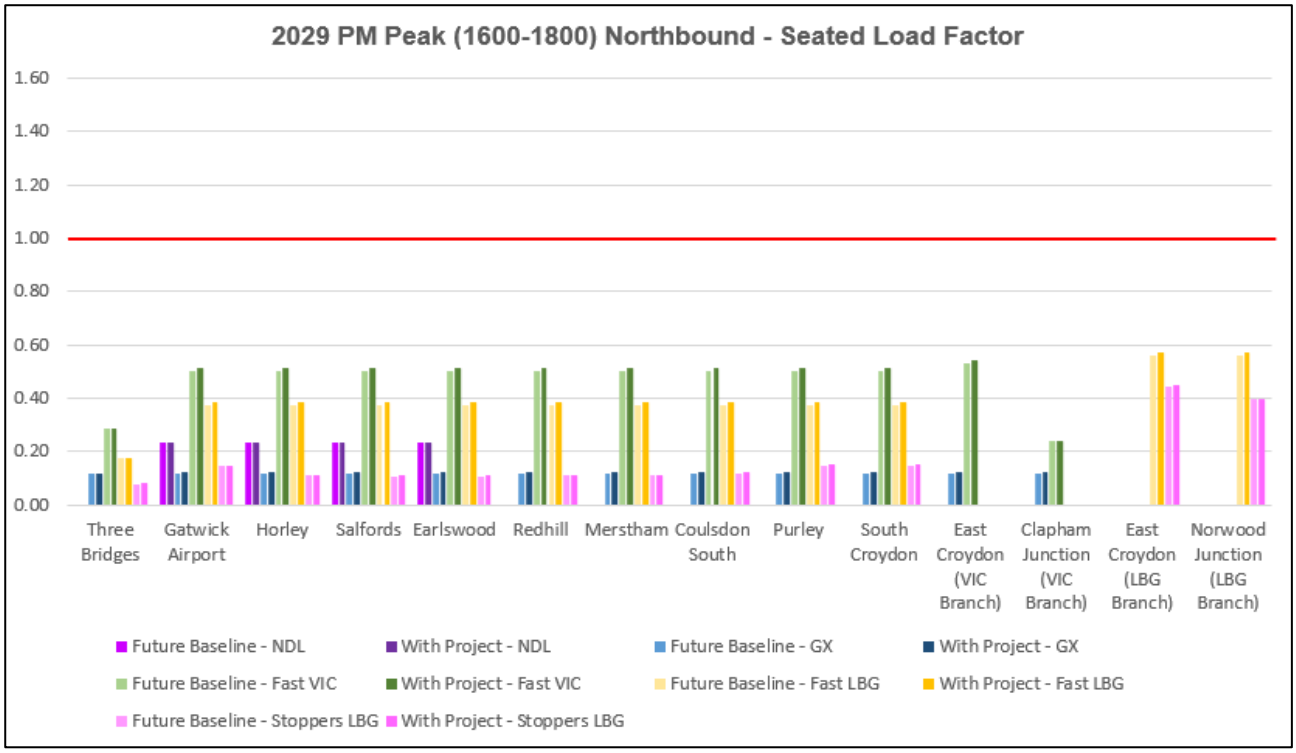
Station	2029 PM Peak Northbound (1600-1900)													
	Change in Line Loading on Departure							Percentage Change						
	NDL	GX	Fast VIC	Stoppers VIC	Fast LBG	Stoppers LBG	Total	NDL	GX	Fast VIC	Stoppers VIC	Fast LBG	Stoppers LBG	Total
Three Bridges	-	4	15	-	11	6	**36**	-	1%	1%	-	1%	1%	**1%**
Gatwick Airport	5	21	82	-	77	14	**199**	2%	4%	2%	-	2%	1%	**2%**
Horley	5	21	82	-	77	13	**198**	2%	4%	2%	-	2%	1%	**2%**
Salfords	5	21	82	-	77	13	**198**	2%	4%	2%	-	2%	1%	**2%**
Earlswood	5	21	82	-	77	13	**198**	2%	4%	2%	-	2%	1%	**2%**
Redhill	-	21	82	-	77	8	**188**	-	4%	2%	-	2%	1%	**2%**
Merstham	-	21	82	-	77	8	**188**	-	4%	2%	-	2%	1%	**2%**
Coulsdon South	-	21	82	-	77	8	**188**	-	4%	2%	-	2%	1%	**2%**
Purley	-	21	82	-	77	8	**188**	-	4%	2%	-	2%	1%	**2%**
South Croydon	-	21	82	-	77	8	**188**	-	4%	2%	-	2%	1%	**2%**
East Croydon (VIC Branch)	-	21	61	-	-	-	**81**	-	4%	2%	-	-	-	**2%**
Clapham Junction (VIC Branch)	-	21	26	-	-	-	**46**	-	4%	1%	-	-	-	**2%**
East Croydon (LBG Branch)	-	-	-	-	74	21	**95**	-	-	-	-	2%	0%	**1%**
Norwood Junction (LBG Branch)	-	-	-	-	74	23	**97**	-	-	-	-	2%	1%	**1%**

PM Peak (1600-1900)

12.9.50 In the PM peak, the highest increase in rail passengers is in the northbound direction, from Gatwick to London. Table 12.9.4 provides a summary of the increase in line loading by station in the northbound direction, again demonstrating the operational value for money that Gatwick growth provides.

12.9.51 Table 12.9.7 shows that on the rail services being assessed, the Project adds up to around 200 passengers. Most of these passengers are expected on the fast train services to London Victoria and London Bridge. The increase in passengers represents an 2% increase in passengers on the fast services, and 4% on Gatwick Express. To assess the impact on crowding, Diagram 12.9.5 shows the seated load factor assessment.

Diagram 12.9.5: 2029 PM Northbound Seated Load Factor



12.9.52 The above diagram shows that the increase in passengers in the northbound direction will increase the seated load factor across all the lines assessed but there is still more seating available for passengers. The highest seated load factor is up to 0.6 which means that four out of ten seats are available.

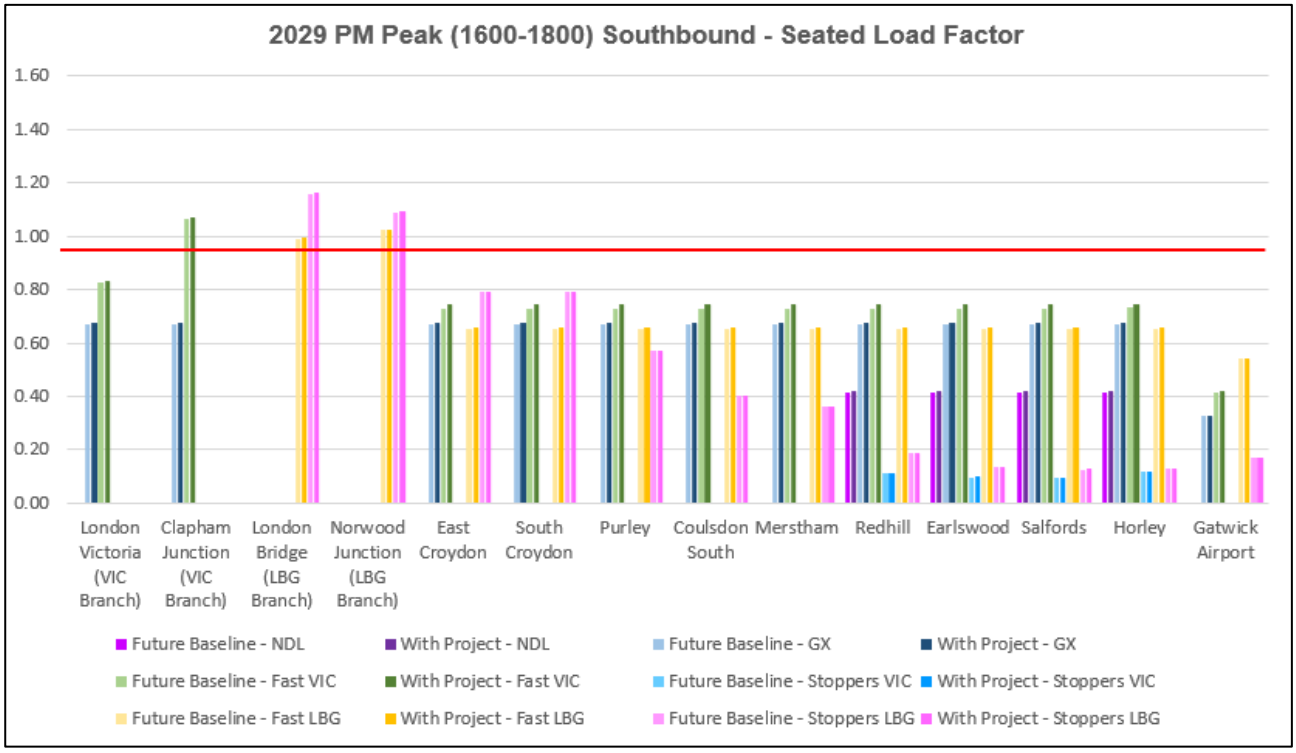
12.9.53 The line loading in the southbound direction has been examined. This is the peak rail network direction in the PM peak and Table 12.9.8 provides a summary of the increase in line loadings in this direction.

Table 12.9.8: 2029 PM Southbound Line Loading

Station	2029 PM Peak Southbound (1600-1900)													
	Change in Line Loading on Departure							Percentage Change						
	NDL	GX	Fast VIC	Stoppers VIC	Fast LBG	Stoppers LBG	Total	NDL	GX	Fast VIC	Stoppers VIC	Fast LBG	Stoppers LBG	Total
London Victoria (VIC Branch)	-	36	21	-	-	-	**57**	-	1%	0%	-	-	-	**1%**
Clapham Junction (VIC Branch)	-	36	33	-	-	-	**69**	-	1%	1%	-	-	-	**1%**
London Bridge (LBG Branch)	-	-	-	-	22	10	**32**	-	-	-	-	0%	0%	**0%**
Norwood Junction (LBG Branch)	-	-	-	-	25	14	**39**	-	-	-	-	0%	0%	**0%**
East Croydon	-	36	73	-	69	2	**180**	-	1%	2%	-	1%	0%	**1%**
South Croydon	-	36	73	-	69	2	**180**	-	1%	2%	-	1%	0%	**1%**
Purley	-	36	73	-	69	2	**180**	-	1%	2%	-	1%	0%	**1%**
Coulsdon South	-	36	73	-	69	2	**181**	-	1%	2%	-	1%	0%	**1%**
Merstham	-	36	73	-	69	3	**181**	-	1%	2%	-	1%	0%	**1%**
Redhill	6	36	73	1	69	6	**191**	1%	1%	2%	1%	1%	1%	**1%**
Earlswood	6	36	73	1	69	5	**191**	1%	1%	2%	1%	1%	1%	**1%**
Salfords	6	36	73	1	69	5	**191**	1%	1%	2%	1%	1%	1%	**1%**
Horley	6	36	73	1	69	6	**192**	1%	1%	2%	1%	1%	1%	**1%**
Gatwick Airport	-	2	1	-	6	2	**10**	-	0%	0%	-	0%	0%	**0%**

12.9.54 The above table shows that the Project adds around 190 passengers to rail services in this direction, which represents an overall increase of 1%. Diagram 12.9.6 shows the seated load factor assessment for the PM peak southbound direction services.

Diagram 12.9.6: 2029 PM Southbound Seated Load Factor



12.9.55 The above diagram shows that trains departing London in the PM peak are mostly occupied beyond their seated capacity. However, on arrival at Clapham Junction and East Croydon, sufficient passengers alight such that seats become available indicating spare seated capacity. For the stations where seating capacity is exceeded, standing capacity has been assessed and this is shown in Table 12.9.9.

Table 12.9.9: 2029 PM Southbound Standing Capacity Assessment

Station	2029 PM Peak Southbound (1600-1800) - Percentage of Standing Capacity Occupied													
	Future Baseline 2029							Future Baseline 2029 + Project (% change)						
	NDL	GX	Fast VIC	Stoppers VIC	Fast LBG	Stoppers LBG	Total	NDL	GX	Fast VIC	Stoppers VIC	Fast LBG	Stoppers LBG	Total
Clapham Junction (VIC Branch)	-	0%	11%	-	-	-	1%	-	0% (0.0%)	12% (0.9%)	-	-	-	1% (0.1%)
London Bridge (LBG Branch)	-	-	-	-	0%	10%	3%	-	-	-	-	0% (0.0%)	10% (0.1%)	3% (0.0%)
Norwood Junction (LBG Branch)	-	-	-	-	2%	6%	2%	-	-	-	-	2% (0.2%)	6% (0.1%)	2% (0.1%)

12.9.56 On average over the two-hour PM peak period, the highest percentage of standing capacity occupied is 11% in the future baseline, which indicates that rail services are very busy but suggests that there is some spare standing capacity available. The Project will not materially change congestion in 2029, with the highest increase in standing capacity occupied being 0.9% on fast services out of London Victoria.

Summary on Rail Crowding

12.9.57 A summary of rail crowding by peak hour and direction is as follows:

- **AM Peak** – The highest increase in line loading as a result of the Project is up to 9%. This is on the southbound services, where there is sufficient number of spare seats for passengers. On the northbound services, there will be passengers standing on some services north of Purley. The highest percentage of standing capacity occupied on train services is around 35%, indicating busy trains into London. However, the Project only accounts for a 0.6% change in standing, with the remainder being as a result of high commuter flows into London. The overall magnitude of impact of the Project on rail capacity is therefore considered to be low.
- **PM Peak** - The highest increase in line loading as a result of the Project is up to 4%. This is on the contra-peak northbound services, where there is sufficient number of spare seats for passengers. On the southbound services, there will be passengers standing on some services out of London, with seats only becoming available at Clapham Junction and East Croydon. The highest percentage of standing capacity occupied on a service is 12%, with the Project accounting for a 0.9% change in standing. The overall magnitude of impact is therefore considered to be low.

12.9.58 The overall magnitude of impact is considered to be low and the sensitivity of receptors in terms of public transport capacity is considered to be low to medium. Any effects to changes in crowding levels for 2029 are therefore anticipated to be **negligible adverse** or **minor adverse**, which is not significant.

Crowding in Station

12.9.59 As part of the Station Project, Network Rail has tested station capacity to 2036, assuming growth at the Airport and in terms of background commuter and leisure traffic. The station crowding assessment has been completed for 2032 and 2047 and these results are reported below. When considering both the concourse and platforms in both the 2032 AM and PM peak hours, the magnitude of impact of the Project on crowding is considered to be negligible to low. As demand is higher in 2032 than 2029, this will also be true of this earlier opening year.

Further Mitigation and Future Monitoring

12.9.60 Four junctions have been identified to have moderate adverse effect in terms of driver delay. The junctions in Croydon are due to the issues identified in the strategic model in the Croydon area (see paragraph 12.4.13). Further information is contained in the modelling annex to the PTAR (Appendix 12.9.1) on overall journey times to consider driver delays in more detail. Work will be undertaken to verify model findings as well as to identify mitigation measures if required for the development consent application. Any significant effects on driver delay will be mitigated and it is expected that the residual effect will reduce to minor adverse. No further mitigation or additional monitoring is proposed other than that adopted as part of the Project (as set out in Section 12.8).

12.9.61 Travel Plan monitoring will be ongoing at Gatwick Airport to understand travel patterns and to implement measures to further encourage the use of sustainable modes of transport as part of the Airport Surface Access Strategy.

Significance of Effects

12.9.62 Potential significant effect has been identified for four junctions in terms of driver delay. Further work will be undertaken to verify model findings as well as to identify mitigation measures if required. No other mitigation or monitoring is required; and no other significant effects are identified.

Highway Construction Phase

12.9.63 The Project would include embedded highway improvement works providing grade separation of traffic movements at the North and South Terminal roundabouts and upgrading the Longbridge Roundabout. It is envisaged that highway works will occur after the works on the northern runway are complete and it is operational. The highway works have therefore been assessed assuming an increase in operational traffic associated with the northern runway in 2029.

12.9.64 Construction of the surface access improvements is expected to take place after the main airport construction activities are complete, but as soon as possible thereafter to allow for growth. Construction would be undertaken with the aim of minimising disruption both to airport traffic but also local background traffic.

- At both terminal roundabouts, it is intended that new link roads would be built in turn, to ensure that traffic can continue to flow through the junction whilst construction is underway. As each new link is completed and can be opened to traffic, sections of the existing junction or link roads can be closed, enabling construction to take place at those locations.
- Short duration temporary lane closures may be needed to allow construction activities to proceed safely. Occasional temporary full closures of carriageways or roads may be needed for certain critical activities and these would be timed to avoid the busiest times of the day or night, with appropriate alternate routes in place and signposted.
- Traffic flow around Longbridge Roundabout would be maintained and work would be scheduled to avoid the busiest times of the day or night. Night-working would be minimised but cannot be avoided altogether.
- Alongside construction workforce travel plans, further measures would be introduced for airport staff travel plans to lessen employee car movements during construction periods.

12.9.65 The following would be expected during highway construction.

- Temporary road diversions and lane closures.
- Temporary speed limits.
- Some overnight working.
- Traffic management measures.
- Occasional full closures of carriageways may be needed for certain critical activities and these would be timed to avoid the busiest times of the day or night, with appropriate alternate routes in place and signposted.
- Construction Traffic Management Plan and Staff Travel Plans would be implemented to reduce airport-related traffic from sensitive areas, especially in the peak periods, as far as possible.

Severance

12.9.66 The highway construction phase has been assessed for the AM1 and PM peak periods. The highway flows for these years are contained in Appendix 12.9.2. For the purposes of reporting, only the links which have a magnitude of impact of low, medium and high adverse or beneficial are assessed in this section to focus on potential significant effects. These links and associated flows are shown in Table 12.9.10 for the future baseline, Table 12.9.11 for future baseline with Project and Highway Construction. The net change in traffic flows are shown in Table 12.9.12.

Table 12.9.10: First Full Year of Opening 2029 Traffic Flows – Future Baseline with Project

ID	Road	AM1			AM2			IP			PM		
		All vehs	HGV	% HGV	All vehs	HGV	% HGV	All vehs	HGV	% HGV	All vehs	HGV	% HGV
8	Gatwick Way	439	33	8%	438	42	10%	395	40	10%	306	16	5%
13	Perimeter Road East	1116	87	8%	1073	125	12%	1067	156	15%	510	59	12%
14	Old Brighton Road South (South)	844	31	4%	886	36	4%	697	24	3%	1134	9	1%
15	Old Brighton Road South (North)	526	12	2%	509	19	4%	373	23	6%	1026	15	1%
67	M23 J9, northbound slip (South of junction)	1079	10	1%	907	15	2%	733	36	5%	750	16	2%

Table 12.9.11: First Full Year of Opening 2029 Traffic Flows – Future Baseline with Project and Highway Construction

ID	Road	AM1			AM2			IP			PM		
		All vehs	HGV	% HGV	All vehs	HGV	% HGV	All vehs	HGV	% HGV	All vehs	HGV	% HGV
8	Gatwick Way	458	33	7%	415	43	10%	439	42	10%	426	17	4%
13	Perimeter Road East	1066	79	7%	1023	122	12%	1029	155	15%	1025	61	6%
14	Old Brighton Road South (South)	759	30	4%	680	34	5%	664	28	4%	752	12	2%
15	Old Brighton Road South (North)	553	20	4%	537	23	4%	383	24	6%	483	14	3%
67	M23 J9, northbound slip (South of junction)	654	7	1%	601	11	2%	553	34	6%	616	16	3%

Table 12.9.12: First Full Year of Opening 2029 Traffic Flows – Net Change (Percentage Change in Brackets)

ID	Road	AM1			AM2			IP			PM		
		All vehs	HGV	% HGV	All vehs	HGV	% HGV	All vehs	HGV	% HGV	All vehs	HGV	% HGV
8	Gatwick Way	19 (4%)	0 (0%)	0% (0%)	-23 (-5%)	1 (2%)	1% (1%)	44 (11%)	2 (5%)	-1% (-1%)	120 (39%)	1 (6%)	-1% (-1%)
13	Perimeter Road East	-50 (-4%)	-8 (-9%)	0% (0%)	-50 (-5%)	-3 (-2%)	0% (0%)	-38 (-4%)	-1 (-1%)	0% (0%)	515 (101%)	2 (3%)	-6% (-6%)
14	Old Brighton Road South (South)	-85 (-10%)	-1 (-3%)	0% (0%)	-206 (-23%)	-2 (-6%)	1% (1%)	-33 (-5%)	4 (17%)	1% (1%)	-382 (-34%)	3 (33%)	1% (1%)
15	Old Brighton Road South (North)	27 (5%)	8 (67%)	1% (1%)	28 (6%)	4 (21%)	1% (1%)	10 (3%)	1 (4%)	0% (0%)	-543 (-53%)	-1 (-7%)	1% (1%)
67	M23 J9, northbound slip (South of junction)	-425 (-39%)	-3 (-30%)	0% (0%)	-306 (-34%)	-4 (-27%)	0% (0%)	-180 (-25%)	-2 (-6%)	1% (1%)	-134 (-18%)	0 (0%)	0% (0%)

12.9.67 The above shows that within the whole study area, only five links will experience a change of more than 30% in traffic during the highway construction phase. These are Gatwick Way (Link ID: 8), Perimeter Road East (Link ID: 13), both sections of Old Brighton Road (Link IDs: 14 and 15), and the M23 J9 northbound slip (Link ID:67).

12.9.68 Of these, both sections of Old Brighton Road South (low sensitivity) and the M23 J9 northbound slip (negligible sensitivity) are expected to experience a reduction in traffic flows. The magnitude of impact is considered to be low and the effect of severance on these links is minor beneficial.

12.9.69 Gatwick Way (low sensitivity) is expected to experience an increase of 39% in the PM peak which is a low magnitude of impact. The effect of severance on this link is **minor adverse**.

12.9.70 Perimeter Road East (low sensitivity) will experience a doubling of traffic in the PM peak, with negligible reduction in traffic flows for the other assessment time periods. The magnitude of impact in the PM peak is high and the effect of severance on this link is considered **minor adverse**.

12.9.71 All other links will have a change of traffic of less than 30% and therefore the magnitude of impact on severance is considered to be negligible. The sensitivity of the highway links for pedestrians and cyclists range from negligible to high and the overall effect of severance is considered to be **minor adverse**.

Driver Delay

12.9.72 The following diagram shows the magnitude of impact for driver delay for junctions where the V/C is over 85%. The diagram shows driver delay for all time periods assessed and any overlaps in colours indicate different magnitudes of impact by time period. The highest magnitude of impact for each junction is considered.

Diagram 12.9.7: Highway Construction Driver Delay Magnitude of Impact (all assessment time periods)

12.9.73 The above shows that most junctions (over 1,000) have no significant or low magnitude of impact in terms of delay. Car driver and passenger sensitivity is considered to be medium for junctions where the V/C is over 85%. For the junctions with no significant delays, the driver delay effect is **negligible**. For those with a low magnitude of impact, the driver delay is **minor adverse**.

12.9.74 There is one junction which is shown to have a medium magnitude of delay located near Gatwick Airport, and four junctions are identified with a high magnitude of delay which are located near Gatwick Airport and one in the Croydon area (as per paragraph 12.4.13 above, the Croydon results are not related to the Project but due to model convergence issues which requires review and adjustment in the next stage). For these junctions, the driver delay effect is considered to be **moderate adverse**. Further information is contained in the modelling annex to the PTAR (Appendix 12.9.1) on overall journey times to consider driver delays in more detail, and work will be undertaken to verify model findings as well as to identify mitigation measures if required for the development consent. Any significant effects on driver delay will be mitigated and it is expected that the residual effect will reduce to minor adverse.

Pedestrian and Cyclist Delay

12.9.75 Works to the Longbridge Roundabout would require temporary changes to pedestrian and cycle routes. These are expected to be in the form of temporary diversions and signal-controlled crossing points which could increase pedestrian and cyclist delays. However, it is expected that

the traffic management measures would minimise delays as far as possible and appropriate signage would be provided.

12.9.76 The magnitude of impact is considered to be low and the sensitivity of receptors at Longbridge Roundabout is low to medium. The effect on pedestrian and cycle delays at Longbridge Roundabout are therefore expected to be **minor adverse**.

12.9.77 There are limited pedestrian and cycle provision and movements at the other locations in the area of highway works (North Terminal and South Terminal roundabouts, Airport Way and London Road) and therefore pedestrian and cycle delay is not expected to be affected. For these links and the other roads within the study area which are not identified as construction routes, there will be **no change** to pedestrian and cyclist delay.

Pedestrian and Cyclist Amenity

12.9.78 The suggested threshold for a significant effect on pedestrian and cyclist amenity is when the traffic flows have doubled, as set out in paragraph 12.4.44. As set out in Table 12.9.12, only Perimeter Road East is expected to experience a doubling of flows in the PM peak. The magnitude of impact is considered to be medium and the sensitivity of this link is low. The effect on pedestrian and cyclist amenity on this link is considered to be **minor adverse**.

12.9.79 Amenity is also affected by traffic composition and footway width/separation from traffic. The traffic composition could change with more HGVs and temporary footways and crossing points at Longbridge Roundabout which may increase fear and intimidation for pedestrians and cyclists. The magnitude of impact is considered to be low for routes which would experience construction traffic and temporary traffic management measures. The sensitivity of receptors along the highway links range from negligible to medium. The overall effect on pedestrian and cyclist amenity is considered to be **minor adverse**.

Accidents and Safety

12.9.80 Changes in traffic flows and highway design could influence the risk of accidents. There would be temporary changes to the highway design during the highways' construction period but suitable signage and measures to minimise the impact would be implemented as part of the Construction Traffic Management Plan. The magnitude of impact for accidents and safety is considered to be low.

12.9.81 The sensitivity of receptors in terms of pedestrians and cyclists for the highway works area is considered to be low. The effect on accidents and safety on pedestrians and cyclist is considered **minor adverse** along the construction routes, and no change on all other roads.

12.9.82 The sensitivity of receptors in terms of car drivers for the highway works is considered to be medium. The effect on accidents and safety on car drivers is considered **minor adverse** along the construction routes, and no change on all other roads.

Hazardous Loads

12.9.83 The highway construction works are not expected to generate hazardous loads but changes to highway design and temporary diversion routes during the construction period could affect the existing transportation of hazardous loads on the public highway. Any effects will be assessed as part of the ES and, for the purposes of this chapter, it is assumed that temporary diversions would

be safe and clearly signposted. The proposed temporary routes are not known yet but will be assessed in the final ES.

Effects on Public Transport Amenity

12.9.84 Changes in passenger crowding during this phase would be primarily associated with the growth in passenger numbers and those of the highway construction workforce who travel to site by rail.

12.9.85 Capacity modelling shows there is plenty of seating capacity available in 2029, including with incremental growth in passengers (see paragraphs 12.9.43 onwards). This likely level of construction trips is not expected to have a measurable impact on rail crowding. Measures within the Travel Plan for construction workers could include staggered shift start and end times to reduce peak period pressure as well as provision of bus services to park and ride sites and to specific towns and cities where construction workers come from.

12.9.86 The magnitude of impact is considered to be negligible and the sensitivity of receptors in terms of public transport capacity is also considered to be low. Any effects to changes in crowding levels are therefore anticipated to be **negligible adverse**, and are not considered significant

Further Mitigation and Future Monitoring

12.9.87 Six junctions have been identified to have moderate adverse effect in terms of driver delay. The junctions in Croydon relate to model convergence which requires review and adjustment. These effects are not related to the Project (see paragraph 12.4.13). Further information is contained in the modelling annex to the PTAR (Appendix 12.9.1) on overall journey times to consider driver delays in more detail. Work will be undertaken to verify model findings as well as to identify any mitigation measures if required for the development consent application. It is expected that the residual effect will reduce to minor adverse. No further mitigation has been identified at this stage.

12.9.88 Construction activities are expected to be monitored as part of the Construction Traffic Management Plan. No further monitoring measures are currently proposed.

Significance of Effects

12.9.89 Potential significant effect identified for six junctions in terms of driver delay. Further work will be undertaken to verify model findings as well as to identify mitigation measures if required. No other significant effects have been identified for this assessment year. No further mitigation or monitoring has been identified; therefore, the significance of effects would remain as presented above.

Interim Assessment Year: 2032

12.9.90 The annual passenger demand for 2032 is expected to increase from 59.4 mppa in the future baseline scenario to 72.3 million with the Project. Trip generation associated with 2032 with the Project is provided in the PTAR (Appendix 12.9.1).

12.9.91 To deliver the growth in the with-Project scenario, surface access improvements are required. It is expected that highway works would begin after the opening year of the Project. While some highway works may continue into 2032, the assessment for this period has been undertaken assuming all highway works are completed, and the northern runway is fully operational. The scope of the surface access improvements will involve providing grade separation of traffic

movements at South Terminal and North Terminal roundabouts, and improvements at Longbridge Roundabout.

Severance

12.9.92 The peak hour highway flows for the interim assessment year are contained in Appendix 12.9.2. For the purposes of reporting, only the links which have a magnitude of impact of low, medium and high adverse or beneficial are assessed in this section to focus on potential significant effects. These links and associated flows are shown in Table 12.9.13 for the Future Baseline, Table 12.9.14 for future baseline with Project. The net change in traffic flows are shown in Table 12.9.15.

Table 12.9.13: Interim Assessment Year 2032 Traffic Flows – Future Baseline

ID	Road	AM1			AM2			IP			PM		
		All vehs	HGV	% HGV	All vehs	HGV	% HGV	All vehs	HGV	% HGV	All vehs	HGV	% HGV
2	A23 Airport Way	4600	164	4%	4328	184	4%	3874	246	6%	4397	114	3%
5	Longbridge Way	812	110	14%	831	98	12%	827	146	18%	940	60	6%
6	Northgate Road	611	77	13%	594	74	12%	613	148	24%	566	41	7%
8	Gatwick Way	467	32	7%	392	43	11%	407	39	10%	404	16	4%
9	Perimeter Road North, between NT and ST	1046	137	13%	1009	155	15%	987	199	20%	885	70	8%
13	Perimeter Road East	840	82	10%	820	121	15%	899	149	17%	810	58	7%
14	Old Brighton Road South (South)	757	31	4%	798	36	5%	644	24	4%	710	9	1%
15	Old Brighton Road South (North)	318	14	4%	304	19	6%	246	24	10%	299	14	5%
34	Waddon New Road, Croydon	164	33	20%	140	33	24%	65	31	48%	73	31	42%
35	Reeves Corner, Croydon	139	33	24%	120	32	27%	42	30	71%	40	30	75%
36-38	Church Street / Drummond Road, Croydon	607	45	7%	593	45	8%	299	38	13%	404	33	8%
39	London Road, Croydon ROAD	282	104	37%	246	104	42%	197	103	52%	109	101	93%

ID	Road	AM1			AM2			IP			PM		
		All vehs	HGV	% HGV	All vehs	HGV	% HGV	All vehs	HGV	% HGV	All vehs	HGV	% HGV
41	Poplar Walk (west), Croydon	50	50	100%	50	50	100%	241	52	22%	230	51	22%
42	Poplar Walk (east), Croydon	70	70	100%	70	70	100%	260	71	27%	249	70	28%
56	A213 Windmill Road	1014	15	1%	893	13	1%	608	31	5%	687	7	1%
67	M23 J9, northbound slip (South of junction)	1284	11	1%	1071	14	1%	784	34	4%	754	16	2%

Table 12.9.14: Interim Assessment Year 2032 – Future Baseline with Project

ID	Road	AM1			AM2			IP			PM		
		All vehs	HGV	% HGV	All vehs								
2	A23 Airport Way	5949	197	3%	5761	244	4%	4608	268	6%	5070	127	3%
5	Longbridge Way	1021	138	14%	829	115	14%	1134	248	22%	851	71	8%
6	Northgate Road	441	99	22%	382	88	23%	344	94	27%	202	49	24%
8	Gatwick Way	1167	128	11%	1017	136	13%	943	121	13%	659	54	8%
9	Perimeter Road North, between NT and ST	765	60	8%	676	84	12%	624	51	8%	483	30	6%
13	Perimeter Road East	1258	100	8%	1213	149	12%	1216	185	15%	667	72	11%
14	Old Brighton Road South (South)	929	33	4%	911	33	4%	694	26	4%	1112	9	1%
15	Old Brighton Road South (North)	594	16	3%	564	20	4%	405	25	6%	1059	16	2%
34	Waddon New Road, Croydon	161	33	20%	133	33	25%	64	31	48%	223	32	14%
35	Reeves Corner, Croydon	140	33	24%	113	32	28%	41	30	73%	199	32	16%
36-38	Church Street / Drummond Road, Croydon	627	46	7%	562	44	8%	303	38	13%	601	36	6%
39	London Road, Croydon ROAD	303	104	34%	225	104	46%	197	103	52%	234	102	44%

ID	Road	AM1			AM2			IP			PM		
		All vehs	HGV	% HGV	All vehs								
41	Poplar Walk (west), Croydon	50	50	100%	50	50	100%	246	52	21%	358	51	14%
42	Poplar Walk (east), Croydon	70	70	100%	70	70	100%	265	71	27%	377	70	19%
56	A213 Windmill Road	1002	14	1%	772	12	2%	606	32	5%	903	12	1%
67	M23 J9, northbound slip (South of junction)	1648	15	1%	1478	25	2%	975	41	4%	1009	19	2%

Table 12.9.15: Interim Assessment Year 2032 – Net Change (Percentage Change in Brackets)

ID	Road	AM1			AM2			IP			PM		
		All vehs	HGV	% HGV	All vehs	HGV	% HGV	All vehs	HGV	% HGV	All vehs	HGV	% HGV
2	A23 Airport Way	1349 (29%)	33 (20%)	0% (0%)	1433 (33%)	60 (33%)	0% (0%)	734 (19%)	22 (9%)	-1% (-1%)	673 (15%)	13 (11%)	0% (0%)
5	Longbridge Way	209 (26%)	28 (25%)	0% (0%)	-2 (0%)	17 (17%)	2% (2%)	307 (37%)	102 (70%)	4% (4%)	-89 (-9%)	11 (18%)	2% (2%)
6	Northgate Road	-170 (-28%)	22 (29%)	10% (10%)	-212 (-36%)	14 (19%)	11% (11%)	-269 (-44%)	-54 (-36%)	3% (3%)	-364 (-64%)	8 (20%)	17% (17%)
8	Gatwick Way	700 (150%)	96 (300%)	4% (4%)	625 (159%)	93 (216%)	2% (2%)	536 (132%)	82 (210%)	3% (3%)	255 (63%)	38 (238%)	4% (4%)
9	Perimeter Road North, between NT and ST	-281 (-27%)	-77 (-56%)	-5% (-5%)	-333 (-33%)	-71 (-46%)	-3% (-3%)	-363 (-37%)	-148 (-74%)	-12% (-12%)	-402 (-45%)	-40 (-57%)	-2% (-2%)
13	Perimeter Road East	418 (50%)	18 (22%)	-2% (-2%)	393 (48%)	28 (23%)	-2% (-2%)	317 (35%)	36 (24%)	-1% (-1%)	-143 (-18%)	14 (24%)	4% (4%)
14	Old Brighton Road South (South)	172 (23%)	2 (6%)	-1% (-1%)	113 (14%)	-3 (-8%)	-1% (-1%)	50 (8%)	2 (8%)	0% (0%)	402 (57%)	0 (0%)	0% (0%)
15	Old Brighton Road South (North)	276 (87%)	2 (14%)	-2% (-2%)	260 (86%)	1 (5%)	-3% (-3%)	159 (65%)	1 (4%)	-4% (-4%)	760 (254%)	2 (14%)	-3% (-3%)
34	Waddon New Road, Croydon	-3 (-2%)	0 (0%)	0% (0%)	-7 (-5%)	0 (0%)	1% (1%)	-1 (-2%)	0 (0%)	1% (1%)	150 (205%)	1 (3%)	-28% (-28%)
35	Reeves Corner, Croydon	1 (1%)	0 (0%)	0% (0%)	-7 (-6%)	0 (0%)	2% (2%)	-1 (-2%)	0 (0%)	2% (2%)	159 (398%)	2 (7%)	-59% (-59%)

ID	Road	AM1			AM2			IP			PM		
		All vehs	HGV	% HGV	All vehs	HGV	% HGV	All vehs	HGV	% HGV	All vehs	HGV	% HGV
36-38	Church Street / Drummond Road, Croydon	20 (3%)	1 (2%)	0% (0%)	-31 (-5%)	-1 (-2%)	0% (0%)	4 (1%)	0 (0%)	0% (0%)	197 (49%)	3 (9%)	-2% (-2%)
39	London Road, Croydon ROAD	21 (7%)	0 (0%)	-3% (-3%)	-21 (-9%)	0 (0%)	4% (4%)	0 (0%)	0 (0%)	0% (0%)	125 (115%)	1 (1%)	-49% (-49%)
41	Poplar Walk (west), Croydon	0 (0%)	0 (0%)	0% (0%)	0 (0%)	0 (0%)	0% (0%)	5 (2%)	0 (0%)	0% (0%)	128 (56%)	0 (0%)	-8% (-8%)
42	Poplar Walk (east), Croydon	0 (0%)	0 (0%)	0% (0%)	0 (0%)	0 (0%)	0% (0%)	5 (2%)	0 (0%)	-1% (-1%)	128 (51%)	0 (0%)	-10% (-10%)
56	A213 Windmill Road	-12 (-1%)	-1 (-7%)	0% (0%)	-121 (-14%)	-1 (-8%)	0% (0%)	-2 (0%)	1 (3%)	0% (0%)	216 (31%)	5 (71%)	0% (0%)
67	M23 J9, northbound slip (South of junction)	364 (28%)	4 (36%)	0% (0%)	407 (38%)	11 (79%)	0% (0%)	191 (24%)	7 (21%)	0% (0%)	255 (34%)	3 (19%)	0% (0%)

12.9.93 Table 12.9.15 shows a selection of links which will experience more than 30% in traffic flows for one or more peak periods. Some of these links are in Croydon (see paragraph 12.4.13 on the modelling of Croydon). These links have been considered against the magnitude of impact for severance based on IEMA, as set out in Table 12.4.5.

12.9.94 The following links are expected to have an increase of 30% to 60% (low impact):

- Link 2: A23 Airport Way (low sensitivity) in the AM2 period;
- Link 5: Longbridge Way (low sensitivity) in the IP period;
- Link 13: Perimeter Road East (low sensitivity in the AM1, AM2 and IP periods;
- Link 14: Old Brighton Road South, southern section (low sensitivity) in the PM period;
- Links 36-38: Church Street / Drummond Road, Croydon (medium sensitivity) in the PM period;
- Links 41-42: Poplar Walk Croydon (medium sensitivity) in the PM period;
- Link 56: A213 Windmill Road (high sensitivity due to nearby primary school and nursery) in the PM period; and
- Link 67: M23 J9 northbound slip (negligible sensitivity), in the AM2 and PM periods.

12.9.95 The above links would have a **minor adverse** severance effect.

12.9.96 The following link is expected to have an increase of 60% to 90% (medium impact).

- Link 15: Old Brighton Road South, northern section (low sensitivity) in the AM1, AM2 and IP periods.

12.9.97 The above link would have a **minor adverse** severance effect.

12.9.98 The following links are expected to have an increase of more than 90% (high impact):

- Link 8: Gatwick Way (low sensitivity) in the AM1, AM2, IP and PM periods;
- Link 15: Old Brighton Road South, northern section (low sensitivity) in the PM period;
- Link 34: Waddon New Road, Croydon (medium sensitivity) in the PM period;
- Link 35: Reeves Corner, Croydon (medium sensitivity) in the PM period; and
- Link 39: London Road, Croydon (medium sensitivity) in the PM period.

12.9.99 The above links with low sensitivity would have a severance effect of **minor adverse**, and those with medium sensitivity would have a severance effect of **moderate adverse**. It is worth noting that most of the links experience a high increase in traffic flows are in Croydon during the PM peak and this area will be further reviewed in the modelling work for the development consent application and the supporting ES.

12.9.100 In addition to the above, two links are expected to experience a reduction 30% to 60% (low beneficial impact).

- Link 6: Northgate Road (negligible sensitivity) in the AM2, IP and PM peak periods.
- Link 9: Perimeter Road North, between North Terminal (NT) and South Terminal (ST) (low sensitivity) in the AM2, IP and PM peak periods.

12.9.101 Northgate Road would have **negligible beneficial** and Perimeter Road North would have a **minor beneficial** severance effect.

12.9.102 All other changes in traffic flows are below 30% and the magnitude of impact is considered to be negligible. The sensitivity of the pedestrians and cyclists along the highway links range from negligible to medium.

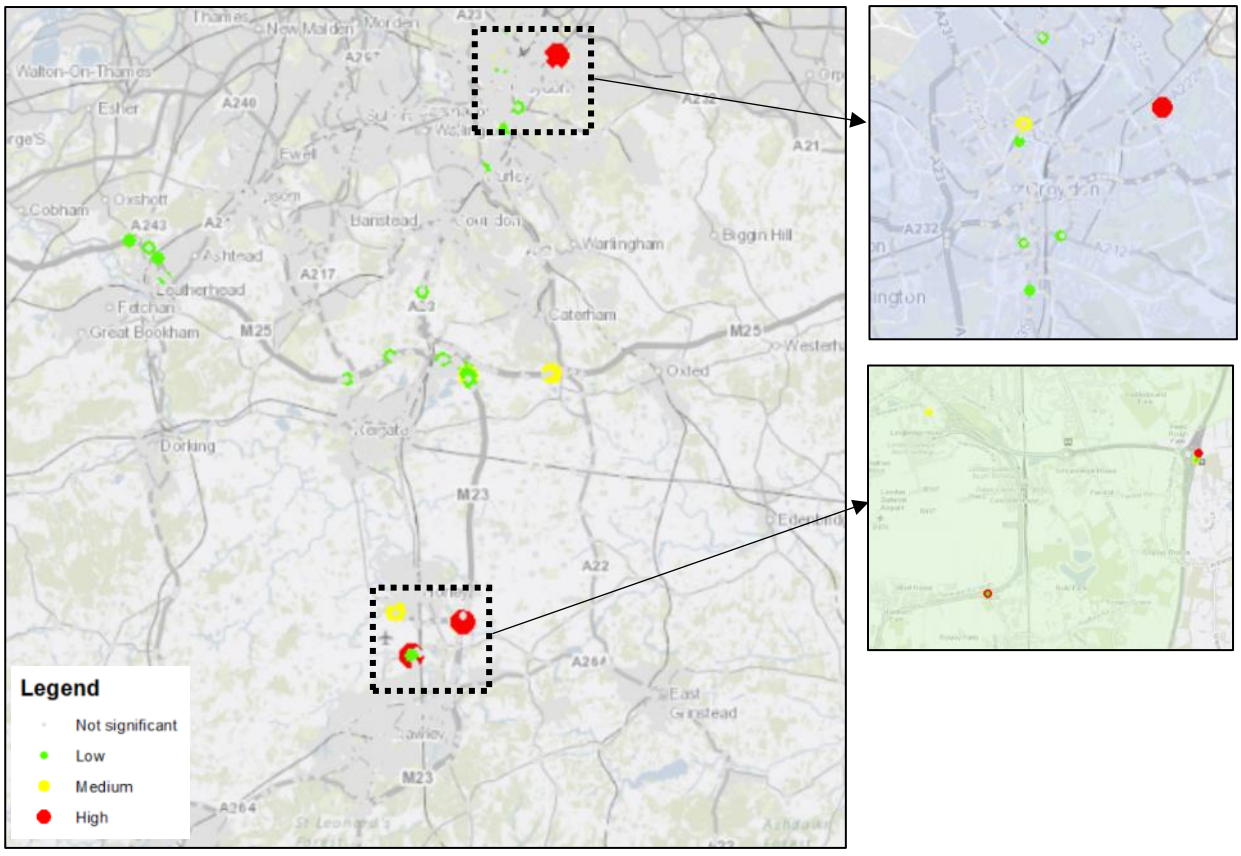
12.9.103 Overall, the effect of the Project on severance can be considered to be **minor adverse**, with some of the more sensitive links experiencing **moderate adverse** effects during at least one of the time periods modelled (AM1, AM2, IP or PM peak periods). The links with moderate adverse effects in the Croydon area relate to model convergence which requires review and adjustment (see paragraph 12.4.13). These effects are not related to the Project.

Driver Delay

12.9.104 The embedded surface access improvement measures in the future baseline 2032 with Project scenario aim to alleviate potential significant effects on driver delay as much as possible. Analysis indicates that around 75% Gatwick traffic uses the M23 Spur and accordingly this is where highway improvements have been proposed. Work is ongoing to optimise designs to improve traffic flow.

12.9.105 The following diagram shows the magnitude of impact for driver delay for junctions where the V/C is over 85%. The diagram shows driver delay for all time periods assessed and any overlaps in colours indicate different magnitudes of impact by time period. The highest magnitude of impact for each junction is considered.

Diagram 12.9.8: 2032 Driver Delay Magnitude of Impact (all assessment time periods)



12.9.106 The above shows that most junctions (over 1,000) have no significant or low magnitude of impact in terms of delay. Car driver and passenger sensitivity is considered to be medium for junctions where the V/C is over 85%. For the junctions with no significant delays, the driver delay effect is **negligible**. For those with a low magnitude of impact, the driver delay is **minor adverse**.

12.9.107 There are five junctions which are shown to have a medium magnitude of delay. Three junctions are identified with a high magnitude of delay, one is located in the Croydon area, and two are located near the airport at the A23 London Road / Gatwick Road roundabout and M23 J9. The highway network proximal to the Airport including M23 Junction 9 and the A23 has been analysed further using VISSIM modelling, as described in the PTAR (Appendix 12.9.1). VISSIM is more appropriate tool for assessing junction performance than a strategic highway model and allows for balancing of signal timings as potential mitigation.

12.9.108 For these junctions, the driver delay effect is considered to be **moderate adverse**. Further information is contained in the modelling annex to the PTAR (Appendix 12.9.1) on overall journey times to consider driver delays in more detail, and work will be undertaken to verify model findings as well as to identify mitigation measures (if required) for the DCO. Any significant effects on driver delay will be mitigated and it is expected that the residual effect will reduce to minor adverse.

Pedestrian and Cyclist Delay

12.9.109 The highway improvements proposed as part of the Project would change some pedestrian and cycle routes at the North Terminal, South Terminal and Longbridge Roundabout junctions. The works are expected to improve pedestrian and cycle accessibility and these movements would be separated from general traffic where practicable. Any proposed changes to the Longbridge Roundabout would retain pedestrian crossings on all arms. Within the terminal forecourts, the Zebra crossings would be retained. Existing off-road routes and National Cycle Route 21 underneath Airport Way near South Terminal would also be retained. In addition, pedestrian and cycling improvements have been identified as part of the Gatwick Airport's Capital Investment Plan, which includes new linkages. Further details are contained in the PTAR (Appendix 12.9.1).

12.9.110 The magnitude of impact for the highway improvement works is considered to be negligible to low, the sensitivity of receptors along these routes range from negligible to medium. The changes to pedestrian and cycle delay would be **negligible beneficial**, and the junctions with proposed highway improvements with the Project would have **minor beneficial** effects.

12.9.111 The increase in traffic flows can also affect pedestrian and cyclist delay. As set out in paragraph 12.9.98, the highest increases are in the Croydon area in the PM peak. There are existing crossing facilities along these routes and the magnitude of impact can be considered negligible to low. The sensitivity of receptors along these routes range from low to medium and the changes to pedestrian and cycle delay could be considered to be **minor adverse.**

Pedestrian and Cyclist Amenity

12.9.112 The threshold for an effect on pedestrian and cyclist amenity is when the traffic flows have doubled. As shown in Table 12.9.15, Old Brighton Road South (low sensitivity), Waddon New Road (low sensitivity), Reeves Corner (medium sensitivity) and London Road (medium sensitivity) will experience a doubling or more of traffic flows in the PM peak. The magnitude of impact on these links is considered to be medium. The sensitivity of these links' ranges from low to medium.

The effect of the Project on pedestrian and cyclist amenity is considered to be **minor adverse** for the links with low sensitivity, and **moderate adverse** for links with medium sensitivity**.** However, it should be noted that these links generally have low future baseline traffic flows and the links with medium sensitivity and therefore moderate adverse effects are in the Croydon area which are not related to the Project (see paragraph 12.4.13). Further modelling review of these links will be undertaken for the development consent application and the accompanying ES.

12.9.113 The traffic composition can also affect pedestrian and cyclist amenity. The traffic flows contained in Appendix 12.9.2 show that the highest increase in the percentage of HGVs (number of HGVs divided by total vehicle number) is on Northgate Road (Link ID: NT3), with around 10% in the AM1 and AM2 periods and 17% in the PM peak. The magnitude of this impact is considered to be low to medium. There are no pedestrian or cyclist facility along Northgate Road and the sensitivity is considered to be negligible. The effect of the Project on amenity along Northgate Road can be considered to be **negligible adverse**.

Accidents and Safety

12.9.114 The design of the proposed highway improvements would separate through traffic from the North Terminal and South Terminal roundabouts. This would reduce traffic flows through the junction and reduce the risks of conflict and this is considered to be beneficial. In addition, the embedded highway improvements also allow for road surface improvements to help improve skid resistance, whilst speed limits would be reviewed in order to assess the potential for further safety benefits. The magnitude of impact is considered to be negligible to low.

12.9.115 The sensitivity of receptors in terms of pedestrians and cyclists along the highway links range from negligible to medium. The effect of accidents and safety on pedestrians and cyclist is considered to be **minor beneficial** where highway improvements as part of the Project are proposed, and **negligible adverse** on all other roads.

12.9.116 The sensitivity of receptors in terms of car drivers and passengers ranges from low to medium. The effect of accidents and safety on car drivers and passengers is considered **minor beneficial** at the junctions where highway improvements are proposed, and **negligible adverse** for all other roads.

Hazardous Loads

12.9.117 The proposed changes to the highway network are expected to improve the safety of general traffic. The magnitude of impact is expected to be negligible and the sensitivity of receptors is considered to be negligible. The effect on hazardous loads is considered to be **negligible beneficial.**

Effects on Public Transport Amenity

12.9.118 To assess the effect of the Project on public transport amenity, this section considers the impact on passenger crowding on rail services and in Gatwick Airport railway station.

Crowding on Rail Services

AM Peak (0700-0900)

12.9.119 Crowding has been assessed based on line loading in both directions in the AM and PM peaks, and detailed data is contained in the PTAR (Appendix 12.9.1). In the AM peak, the highest

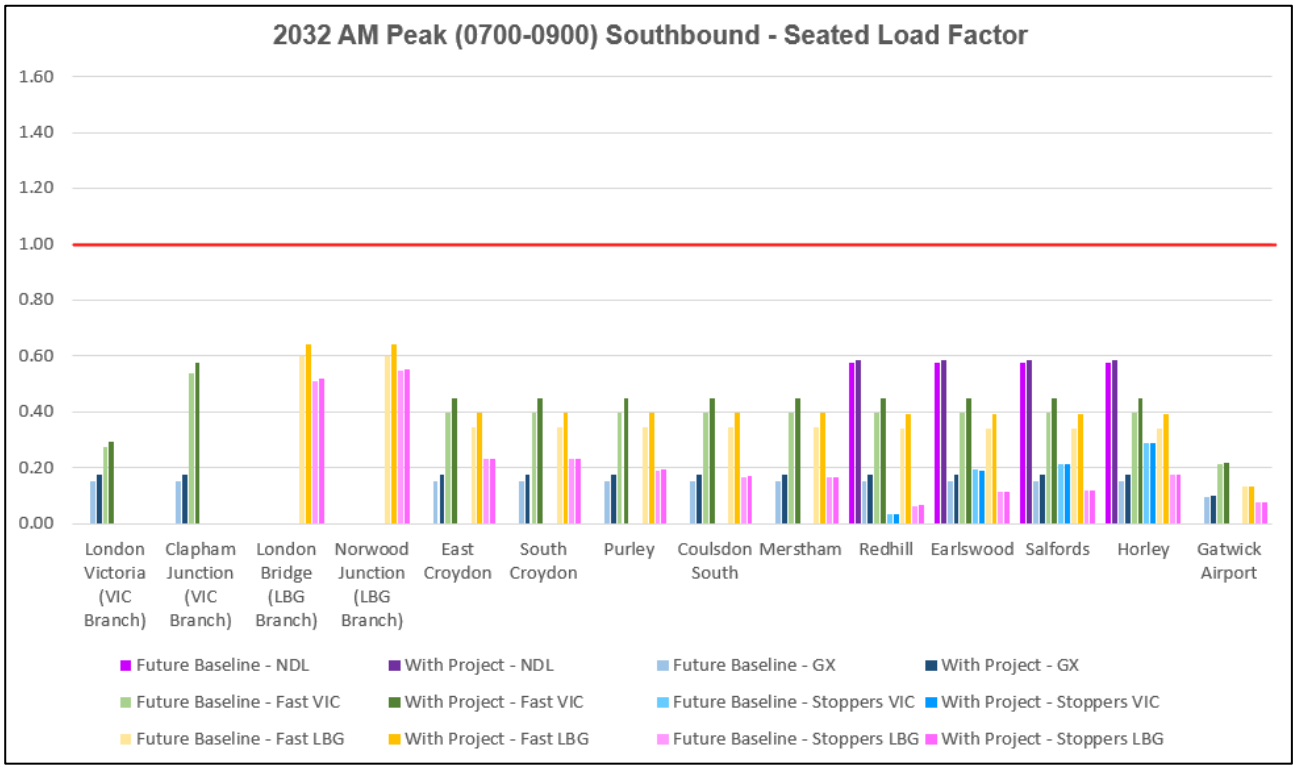
increase in rail passengers is actually in the southbound direction, from London to Gatwick. This indicates that Gatwick Airport growth means better use of contra-peak rail capacity and improves operational value for money. Table 12.9.16 provides a summary of the increase in line loading by station in the southbound direction.

12.9.120 The below table shows that on the rail services being assessed, the Project contributes a total of approx. 950 passengers. Most of these passengers are expected to use the fast train services from London Victoria and London Bridge. The increase in passengers represents a 13% to 14% increase in passengers on the fast services, and 14% on Gatwick Express. To assess the impact on crowding, Diagram 12.9.9 shows the seated load factor assessment.

Table 12.9.16: 2032 AM Southbound Line Loading Capacity Assessment

Station	2029 AM Peak Southbound (0700-0900)													
	Change in Line Loading on Departure							Percentage Change						
	NDL	GX	Fast VIC	Stoppers VIC	Fast LBG	Stoppers LBG	Total	NDL	GX	Fast VIC	Stoppers VIC	Fast LBG	Stoppers LBG	Total
London Victoria (VIC Branch)	-	89	114	-	-	-	203	-	14%	7%	-	-	-	9%
Clapham Junction (VIC Branch)	-	89	225	-	-	-	314	-	14%	7%	-	-	-	8%
London Bridge (LBG Branch)	-	-	-	-	441	44	485	-	-	-	-	7%	2%	5%
Norwood Junction (LBG Branch)	-	-	-	-	441	42	483	-	-	-	-	7%	2%	5%
East Croydon	-	89	306	-	533	17	945	-	14%	13%	-	14%	1%	12%
South Croydon	-	89	306	-	533	17	945	-	14%	13%	-	14%	1%	12%
Purley	-	89	306	-	533	15	943	-	14%	13%	-	14%	2%	12%
Coulsdon South	-	89	306	-	533	15	943	-	14%	13%	-	14%	2%	12%
Merstham	-	89	306	-	533	16	944	-	14%	13%	0%	14%	2%	13%
Redhill	8	89	306	2	530	10	945	1%	14%	13%	5%	14%	3%	12%
Earlswood	8	89	306	-3	530	7	937	1%	14%	13%	-2%	14%	1%	12%
Salfords	8	89	306	-3	530	7	937	1%	14%	13%	-1%	14%	1%	12%
Horley	8	89	306	-3	530	8	938	1%	14%	13%	-1%	14%	1%	11%
Gatwick Airport	-	10	29	-	27	8	73	-	3%	2%	-	2%	2%	2%

Diagram 12.9.9: 2032 AM Southbound Seated Load Factor



12.9.121 The above diagram shows that the increase in passengers in the southbound direction will increase the seated load factor across all the lines assessed, but there is still seating available for passengers. The highest seated load factor is up to around 0.7, which means that three out of ten seats will be available.

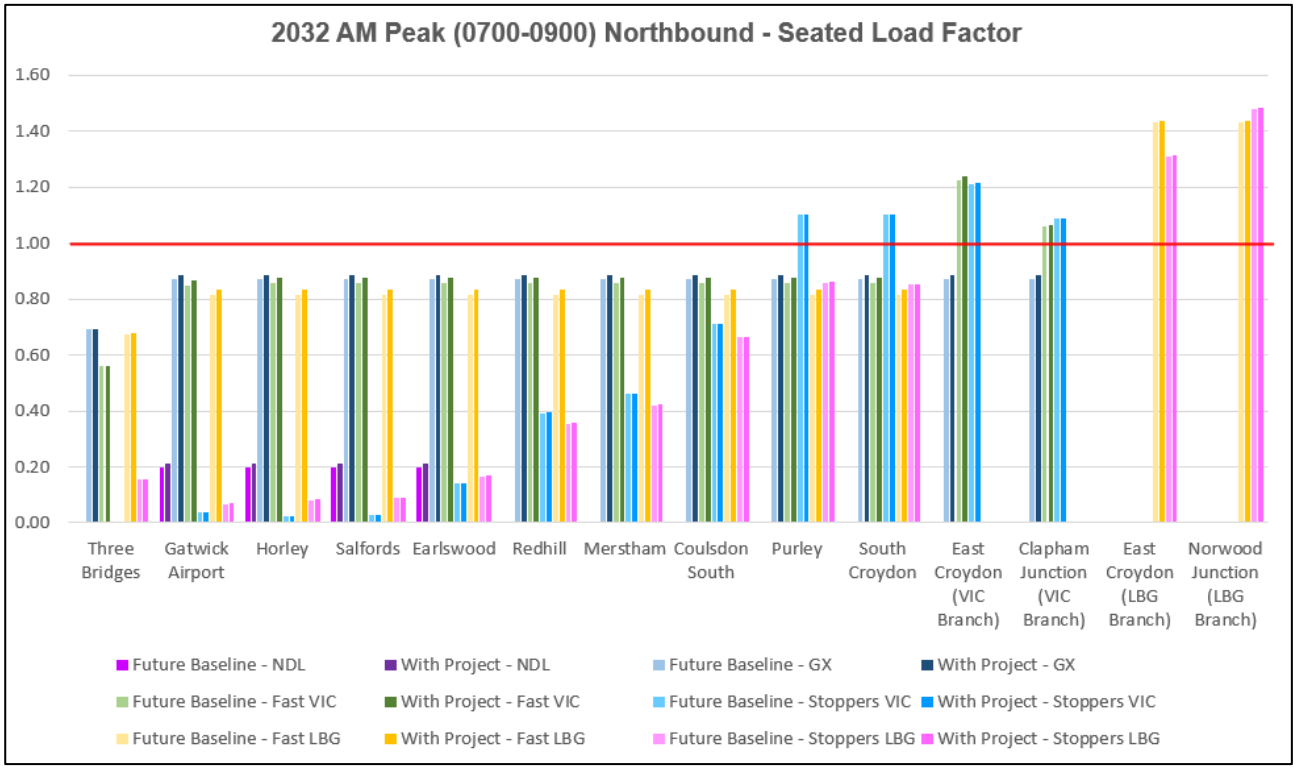
12.9.122 The line loading in the northbound direction has been assessed. This is the peak rail network direction in the AM peak and Table 12.9.17 provides a summary of the increase in line loadings in this direction.

Table 12.9.17: 2032 AM Northbound Line Loading

Station	AM Peak Northbound (0700-0900)													
	Change in Line Loading on Departure							Percentage Change						
	NDL	GX	Fast VIC	Stoppers VIC	Fast LBG	Stoppers LBG	Total	NDL	GX	Fast VIC	Stoppers VIC	Fast LBG	Stoppers LBG	Total
Three Bridges	-	-15	3	-	46	-9	**25**	-	0%	0%	-	1%	-1%	**0%**
Gatwick Airport	14	66	119	1	188	26	**415**	7%	2%	2%	2%	2%	6%	**2%**
Horley	14	66	117	1	188	25	**412**	7%	2%	2%	1%	2%	5%	**2%**
Salfords	14	66	117	1	188	25	**412**	7%	2%	2%	1%	2%	4%	**2%**
Earlswood	14	66	117	8	188	24	**418**	7%	2%	2%	2%	2%	2%	**2%**
Redhill	-	66	117	10	188	14	**396**	-	2%	2%	1%	2%	1%	**2%**
Merstham	-	66	117	9	188	12	**393**	-	2%	2%	1%	2%	0%	**2%**
Coulsdon South	-	66	117	10	188	9	**391**	-	2%	2%	1%	2%	0%	**2%**
Purley	-	66	117	10	188	9	**391**	-	2%	2%	0%	2%	0%	**1%**
South Croydon	-	66	117	10	188	8	**390**	-	2%	2%	0%	2%	0%	**1%**
East Croydon (VIC Branch)	-	66	74	10	-	-	**151**	-	2%	1%	0%	-	-	**1%**
Clapham Junction (VIC Branch)	-	66	17	-1	-	-	**82**	-	2%	0%	0%	-	-	**1%**
East Croydon (LBG Branch)	-	-	-	-	77	10	**87**	-	-	-	-	0%	0%	**0%**
Norwood Junction (LBG Branch)	-	-	-	-	77	13	**90**	-	-	-	-	0%	0%	**0%**

12.9.123 The above table shows that the Project adds around 420 passengers to rail services in this direction, which represents an overall increase of 2%. Diagram 12.9.10 shows the seated load factor assessment for the AM peak northbound direction services.

Diagram 12.9.10: 2032 AM Northbound Seated Load Factor



12.9.124 The above diagram shows that between Three Bridges and Coulsdon South, there is seating available for all passengers. However, north of Purley, there are some services where the seating capacity is exceeded owing to background commuter flows into London. For these stations, standing capacity has been assessed which is shown in Table 12.9.18.

Table 12.9.18: 2032 AM Northbound Standing Capacity Assessment

Station	AM Peak Northbound (0700-0900) - Percentage of Standing Capacity Occupied													
	Future Baseline 2032							Future Baseline 2032 + Project (% change)						
	NDL	GX	Fast VIC	Stoppers VIC	Fast LBG	Stoppers LBG	Total	NDL	GX	Fast VIC	Stoppers VIC	Fast LBG	Stoppers LBG	Total
Purley	-	0%	0%	17%	0%	0%	**1%**	-	0% (0.0%)	0% (0.0%)	17% (0.6%)	0% (0.0%)	0% (0.0%)	**1% (0.0%)**
South Croydon	-	0%	0%	17%	0%	0%	**1%**	-	0% (0.0%)	0% (0.0%)	17% (0.6%)	0% (0.0%)	0% (0.0%)	**1% (0.0%)**
East Croydon (VIC Branch)	-	0%	38%	35%	-	-	**6%**	-	0% (0.0%)	40% (2.0%)	36% (0.7%)	-	-	**6% (0.2%)**
Clapham Junction (VIC Branch)	-	0%	10%	15%	-	-	**2%**	-	0% (0.0%)	11% (0.4%)	15% (-0.1%)	-	-	**2% (0.0%)**
East Croydon (LBG Branch)	-	-	-	-	32%	19%	**19%**	-	-	-	-	32% (0.5%)	19% (0.1%)	**20% (0.2%)**
Norwood Junction (LBG Branch)	-	-	-	-	32%	29%	**22%**	-	-	-	-	32% (0.5%)	30% (0.1%)	**23% (0.3%)**

12.9.125 The standing capacity assessment shows the percentage occupied based on the capacity of each service. On average over the two-hour AM peak period, the highest percentage of standing capacity occupied is 40% on the fast service to London Victoria, which occurs north of East Croydon. Whilst services north of East Croydon are therefore busy, the Project will not significantly increase the percentage of standing capacity occupied when compared to the future baseline 2032 situation, with the highest increase being 2% on the same fast services into London Victoria.

PM Peak (1600-1900)

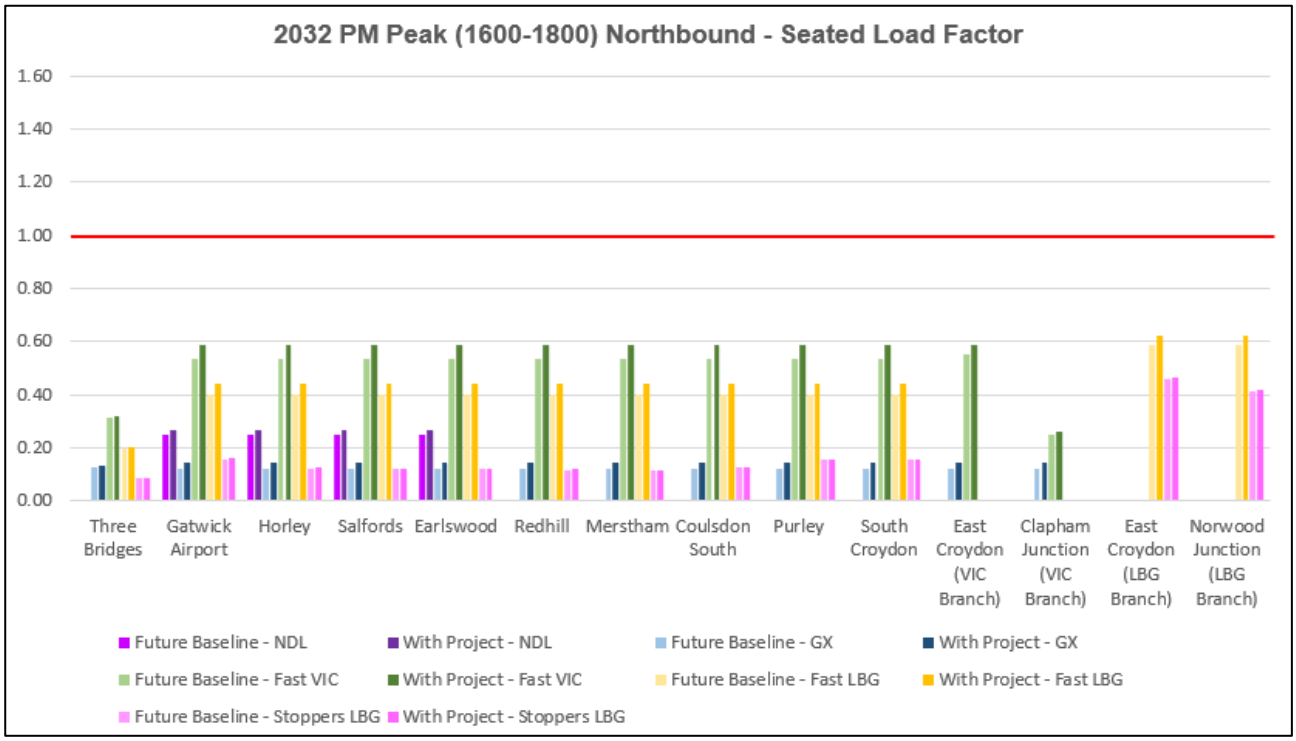
12.9.126 In the PM peak, there is an increase in rail passengers in the northbound direction, from Gatwick to London. Table 12.9.19 provides a summary of the increase in line loading by station in the off-peak northbound direction.

12.9.127 The below table shows that on the rail services being assessed, the Project contributes around 840 additional passengers. Most of these passengers are expected to use the fast train services to London Victoria and London Bridge. The increase in passengers represents a 9 to 10% increase in passengers on the fast services, and 16% on the Gatwick Express. To assess the impact on crowding, Diagram 12.9.11 shows the seated load factor assessment.

Table 12.9.19: 2032 PM Northbound Line Loading Capacity Assessment

Station	2032 PM Peak Northbound (1600-1900)													
	Change in Line Loading on Departure							Percentage Change						
	NDL	GX	Fast VIC	Stoppers VIC	Fast LBG	Stoppers LBG	Total	NDL	GX	Fast VIC	Stoppers VIC	Fast LBG	Stoppers LBG	Total
Three Bridges	-	17	57	-	51	19	**144**	-	3%	2%	-	3%	2%	**3%**
Gatwick Airport	-	96	356	-	327	36	**831**	-	16%	9%	-	10%	2%	**8%**
Horley	16	96	356	-	327	35	**830**	6%	16%	9%	-	10%	3%	**9%**
Salfords	16	96	356	-	327	40	**835**	6%	16%	9%	-	10%	4%	**9%**
Earlswood	16	96	356	-	327	39	**834**	6%	16%	9%	-	10%	3%	**9%**
Redhill	-	96	356	-	327	23	**802**	-	16%	9%	-	10%	2%	**9%**
Merstham	-	96	356	-	327	22	**801**	-	16%	9%	-	10%	2%	**9%**
Coulsdon South	-	96	356	-	327	22	**801**	-	16%	9%	-	10%	2%	**9%**
Purley	-	96	356	-	327	24	**802**	-	16%	9%	-	10%	2%	**8%**
South Croydon	-	96	356	-	327	24	**802**	-	16%	9%	-	10%	2%	**8%**
East Croydon (VIC Branch)	-	96	257	-	-	-	**353**	-	16%	6%	-	-	-	**7%**
Clapham Junction (VIC Branch)	-	96	115	-	-	-	**211**	-	16%	6%	-	-	-	**9%**
East Croydon (LBG Branch)	-	-	-	-	307	85	**392**	-	-	-	-	6%	2%	**4%**
Norwood Junction (LBG Branch)	-	-	-	-	307	82	**389**	-	-	-	-	6%	2%	**4%**

Diagram 12.9.11: 2032 PM Northbound Seated Load Factor



12.9.128 The above diagram shows that the increase in passengers in the northbound direction will increase the seated load factor across all the lines assessed, but there is still seating available for passengers. The highest seated load factor is slightly over 0.6, which means that four out of ten seats will still be available.

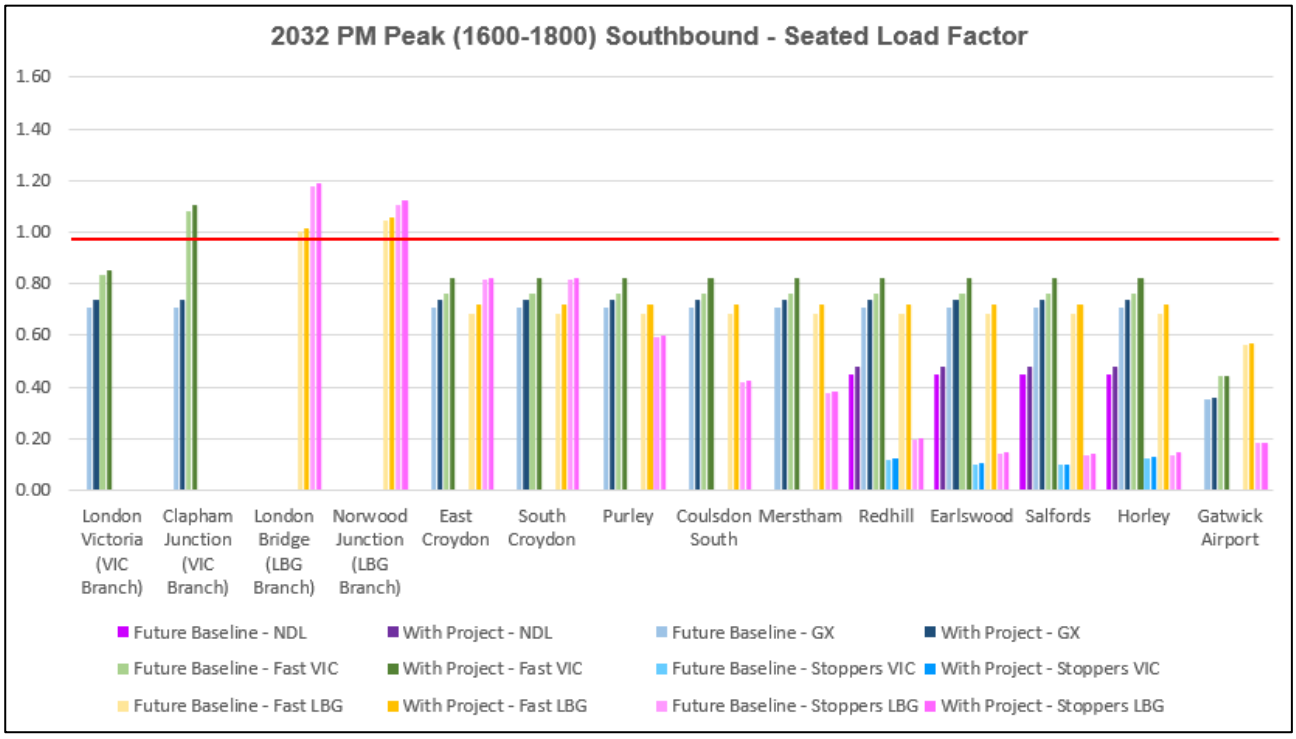
12.9.129 The line loading in the southbound direction has been examined. This is the peak rail network direction in the PM peak and Table 12.9.20 provides a summary of the increase in line loadings in this direction.

Table 12.9.20: 2032 PM Southbound Line Loading

Station	2032 PM Peak Southbound (1600-1900)													
	Change in Line Loading on Departure							Percentage Change						
	NDL	GX	Fast VIC	Stoppers VIC	Fast LBG	Stoppers LBG	Total	NDL	GX	Fast VIC	Stoppers VIC	Fast LBG	Stoppers LBG	Total
London Victoria (VIC Branch)	-	167	115	-	-	-	**282**	-	4%	2%	-	-	-	**3%**
Clapham Junction (VIC Branch)	-	167	152	-	-	-	**319**	-	4%	2%	-	-	-	**3%**
London Bridge (LBG Branch)	-	0	0	-	121	78	**200**	-	0%	0%	-	1%	1%	**1%**
Norwood Junction (LBG Branch)	-	0	0	-	140	84	**224**	-	0%	0%	-	1%	1%	**1%**
East Croydon	-	167	361	-	370	23	**921**	-	4%	8%	-	5%	0%	**5%**
South Croydon	-	167	361	-	370	23	**921**	-	4%	8%	-	5%	0%	**5%**
Purley	-	167	361	-	370	24	**922**	-	4%	8%	-	5%	1%	**5%**
Coulsdon South	-	167	361	-	370	24	**922**	-	4%	8%	-	5%	1%	**5%**
Merstham	-	167	361	-	370	26	**923**	-	4%	8%	-	5%	1%	**5%**
Redhill	30	167	361	5	370	42	**976**	7%	4%	8%	4%	5%	4%	**6%**
Earlswood	30	167	361	6	370	42	**976**	7%	4%	8%	5%	5%	5%	**6%**
Salfords	30	167	361	5	370	38	**971**	7%	4%	8%	5%	5%	5%	**6%**
Horley	30	167	362	6	370	39	**974**	7%	4%	8%	4%	5%	5%	**6%**
Gatwick Airport	-	9	-18	-	47	5	**44**	-	0%	-1%	-	1%	0%	**0%**

12.9.130 The above table shows that the Project adds around 980 passengers to rail services in this direction, which represents an overall increase of 6%, with 8% increase on the fast services from London Victoria. Diagram 12.9.12 shows the seated load factor assessment for the PM peak southbound direction services.

Diagram 12.9.12: 2032 PM Southbound Seated Load Factor



12.9.131 The above diagram shows that trains departing London in the PM peak are mostly occupied beyond their seated capacity. However, on arrival at Clapham Junction and East Croydon, sufficient passengers alight such that seats become available indicating spare capacity. For the stations where seating capacity is exceeded, standing capacity has been assessed and this is shown in Table 12.9.21.

Table 12.9.21: 2032 PM Southbound Standing Capacity Assessment

Station	PM Peak Southbound (1600-1800) - Percentage of Standing Capacity Occupied													
	Future Baseline 2032							Future Baseline 2032 + Project (% change)						
	NDL	GX	Fast VIC	Stoppers VIC	Fast LBG	Stoppers LBG	Total	NDL	GX	Fast VIC	Stoppers VIC	Fast LBG	Stoppers LBG	Total
Clapham Junction (VIC Branch)	-	0%	13%	-	-	-	**1%**	-	0% (0.0%)	18% (4.2%)	-	-	-	**2% (0.5%)**
London Bridge (LBG Branch)	-	-	-	-	0%	11%	**3%**	-	-	-	-	1% (0.8%)	12% (0.8%)	**4% (0.6%)**
Norwood Junction (LBG Branch)	-	-	-	-	3%	7%	**3%**	-	-	-	-	4% (0.9%)	7% (0.9%)	**4% (0.7%)**

12.9.132 On average, over the two-hour PM peak period, the highest percentage of standing capacity is 18% on fast services out of Victoria with the Project. This indicates that rail services are very busy but suggests that there is some spare standing capacity available. The Project will not significantly increase the percentage of standing capacity occupied when compared to the future baseline 2032 situation, with the highest increase as a result of Gatwick passengers being 4.2% on these same fast Victoria services.

Summary on Rail Crowding

12.9.133 A summary of rail crowding by peak hour and direction is as follows:

- **AM Peak** – The highest increase in line loading as a result of the Project is up to 14%. This is on the southbound services, where there are sufficient spare seats for passengers. On the northbound services, there will be passengers standing on some services north of Purley. The highest percentage of standing capacity occupied on train services is around 40%, indicating busy trains into London. However, the Project only accounts for a 2% change in standing, with the remainder being as a result of high commuter flows into London. The overall magnitude of impact of the Project on rail capacity is therefore considered to be low.
- **PM Peak** - The highest increase in line loading as a result of the Project is up to 18%. This is on the contra-peak northbound services, where there are sufficient spare seats for passengers. On the southbound services, there will be passengers standing on some services out of London, with seats only becoming available at Clapham Junction and East Croydon. The highest percentage of standing capacity occupied on a service is 18%, with the Project accounting for a 4.2% change in standing. The overall magnitude of impact is therefore considered to be low.

12.9.134 The overall magnitude of impact is considered to be low and the sensitivity of receptors in terms of public transport capacity is considered to be low to medium. Any effects to changes in crowding levels for 2032 are therefore anticipated to be **minor adverse**, which is not significant.

Crowding in Station

12.9.135 The assessment has also considered crowding in the Gatwick railway station. As set out in paragraph 12.6.65, the assessment assumes that the capacity enhancements associated with the proposed station improvement will be complete before the assessment period.

12.9.136 Diagram 12.9.13 and Diagram 12.9.14 show the Level of Service performance for circulation at the concourse level of the station for the peak hour in the AM and PM peak modelled periods.

Diagram 12.9.13: 2032 Concourse LoS (AM Peak Hour, 08:00 – 09:00)

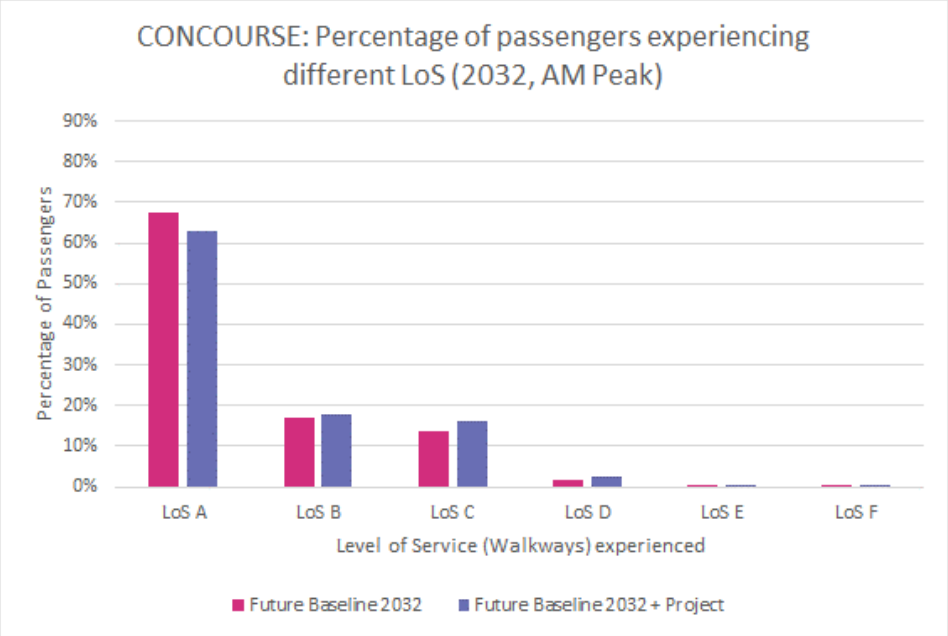
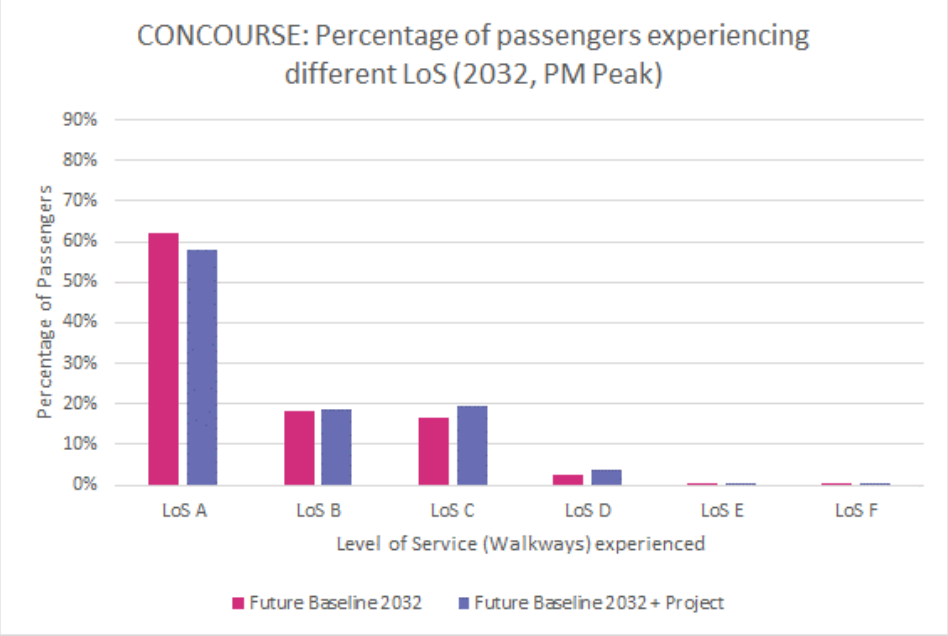


Diagram 12.9.14: 2032 Concourse LoS (PM Peak Hour, 17:00 to 18:00)



12.9.137 The percentage of passengers experiencing a different Level of Service varies but the assessment shows that station performance at concourse level would be predominantly LoS C or better. This represents a low passenger sensitivity to increases in crowding.

12.9.138 The Level of Service performance for queuing and waiting for the station platforms is shown in Diagram 12.9.15 and Diagram 12.9.16, excluding escalator elements. Level of Service is not typically applied to escalator elements as passengers either walk up these or stand at a spacing of their choosing.

Diagram 12.9.15: 2032 Platforms LoS (AM Peak Hour, 08:00 – 09:00)

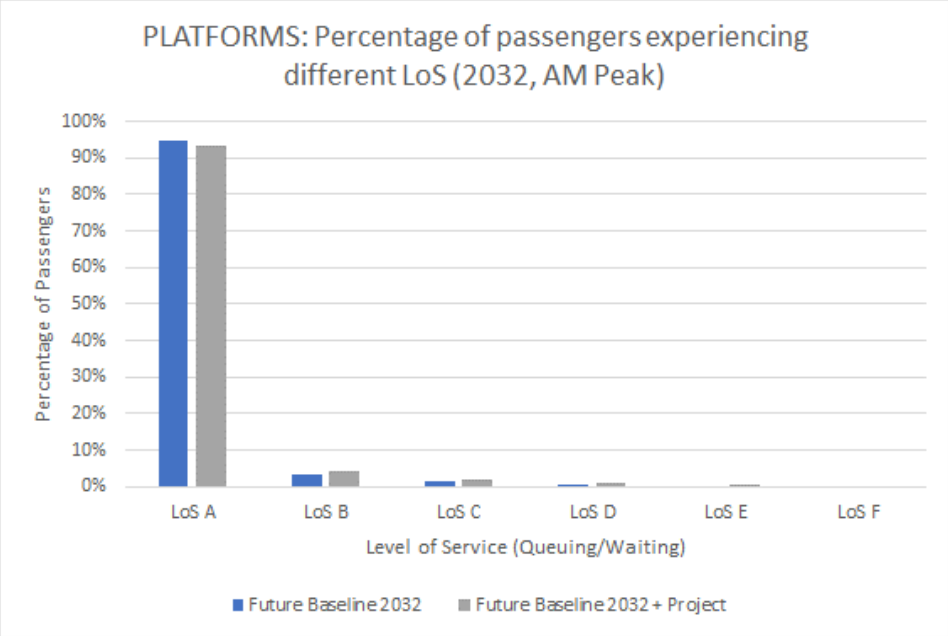
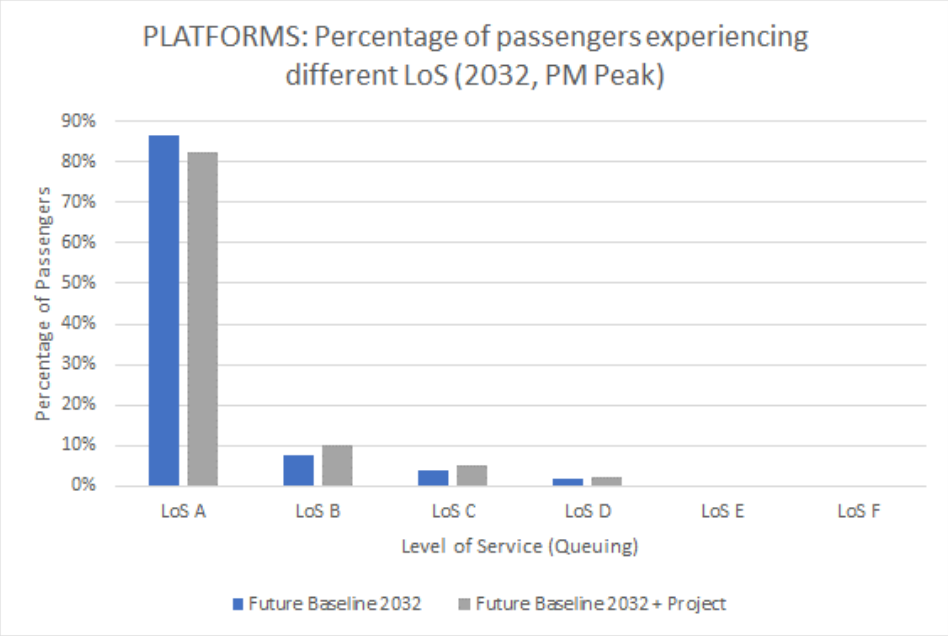


Diagram 12.9.16: 2032 Platforms LoS (PM Peak Hour, 17:00 to 18:00)



12.9.139 The percentage of passengers experiencing a different Level of Service ranges varies but the assessment shows that the station performance at platform level would generally be at LoS C or better, with a very small percentage of passengers experiencing LoS D in the peak hour. In fact, most passengers will experience LoS A for 80% (PM peak) to 90% (AM peak) of the time.

12.9.140 The AM peak period shows a very small percentage would experience a one level change to LoS E with the Project (less than 1%). The magnitude of impact on platform crowding can be considered to be negligible to low.

12.9.141 When considering the full assessment across the station, both the concourse and platforms and both peak hours, the magnitude of impact of the Project on crowding is considered to be negligible to low. The sensitivity of receptors is considered to be low given that most passengers experience LoS C or better. The overall effect on changes in crowding levels for the railway station with the Project are considered **negligible adverse**.

Bus and Coach

12.9.142 Given the adaptability of bus and coach provision, crowding on bus and coach services has not been assessed explicitly within this PEIR assessment. However, the final assessment for the ES to accompany the application for development consent will include more data on service frequency and quality as a measure of public transport amenity.

Further Mitigation and Future Monitoring

12.9.143 Eight junctions have been identified to experience a moderate adverse effect in terms of driver delay. The junctions in Croydon require further review and effects here are not related to the Project (see paragraph 12.4.13). Further information is contained in the modelling annex to the PTAR (Appendix 12.9.1) on overall journey times to consider driver delays in more detail. Work will be undertaken to verify model findings as well as to identify mitigation measures (if required) for the development consent application. No further mitigation or additional monitoring is proposed other than that adopted as part of the Project (as set out in Section 12.8).

Significance of Effects

12.9.144 Potential significant effects have been identified for eight junctions in terms of driver delay. Further work will be undertaken to verify model findings as well as to identify mitigation measures if required. No other significant effects have been identified for this assessment year. No further mitigation or monitoring is required; therefore, the significance of effects would remain as presented above.

Design Year: 2047

12.9.145 The annual passenger demand for 2047 is expected to increase from 67.2 mppa in the future baseline scenario to 80.2 million with the Project. Trip generation associated with 2047 with the Project is provided in the PTAR (Appendix 12.9.1).

Severance

12.9.146 The peak hour highway flows for the design year are contained in Appendix 12.9.2. For the purposes of reporting, only the links which have a magnitude of impact of low, medium and high adverse or beneficial are assessed in this section to focus on potential significant effects. These links and associated flows are shown in Table 12.9.22 for the future baseline, Table 12.9.23 for future baseline with Project. The net change in traffic flows are shown in Table 12.9.24.

Table 12.9.22: Design Year 2047 Traffic Flows – Future Baseline

ID	Road	AM1			AM2			IP			PM		
		All vehs	HGV	% HGV	All vehs	HGV	% HGV	All vehs	HGV	% HGV	All vehs	HGV	% HGV
2	A23 Airport Way	4717	173	4%	4355	217	5%	4042	276	7%	4649	128	3%
4	North Terminal Access	2677	34	1%	2626	63	2%	2441	59	2%	2307	30	1%
5	Longbridge Way	953	128	13%	875	118	13%	917	181	20%	1175	71	6%
6	Northgate Road	770	99	13%	673	89	13%	729	172	24%	722	48	7%
8	Gatwick Way	356	34	10%	339	44	13%	332	35	11%	538	16	3%
9	Perimeter Road North (between NT and ST)	1077	160	15%	1036	170	16%	955	218	23%	895	76	8%
13	Perimeter Road East	900	87	10%	860	125	15%	982	170	17%	472	63	13%
15	Old Brighton Road South (North)	334	21	6%	327	31	9%	272	25	9%	722	17	2%
25	Woodcote Side	506	10	2%	847	10	1%	155	9	6%	397	8	2%
26	Woodcote Green Road (east)	299	15	5%	627	15	2%	14	14	100%	199	14	7%
27	Woodcote Green Road (west)	482	20	4%	762	20	3%	333	20	6%	587	16	3%
32	Beddington Farm Road (west)	399	15	4%	285	12	4%	293	10	3%	370	11	3%
33	Beddington Farm Road (east)	391	7	2%	277	5	2%	286	3	1%	362	3	1%

ID	Road	AM1			AM2			IP			PM		
		All vehs	HGV	% HGV	All vehs	HGV	% HGV	All vehs	HGV	% HGV	All vehs	HGV	% HGV
67	M23 J9, Northbound slip (South of J9)	1320	12	1%	1124	20	2%	839	42	5%	817	18	2%
69	M23 J9, Southbound slip (North of J9)	2255	91	4%	2179	99	5%	1622	81	5%	1465	42	3%

Table 12.9.23: Design Year 2047 Traffic Flows – Future Baseline with Project

ID	Road	AM1			AM2			IP			PM		
		All vehs	HGV	% HGV	All vehs	HGV	% HGV	All vehs	HGV	% HGV	All vehs	HGV	% HGV
2	A23 Airport Way	6078	217	4%	5900	273	5%	5035	296	6%	5437	150	3%
4	North Terminal Access	3485	39	1%	3351	75	2%	2773	67	2%	2463	36	1%
5	Longbridge Way	1181	157	13%	953	132	14%	1289	278	22%	940	79	8%
6	Northgate Road	463	110	24%	396	97	24%	382	108	28%	221	54	24%
8	Gatwick Way	1069	142	13%	982	140	14%	983	134	14%	736	65	9%
9	Perimeter Road North (between NT and ST)	651	62	10%	632	80	13%	631	53	8%	543	37	7%

ID	Road	AM1			AM2			IP			PM		
		All vehs	HGV	% HGV	All vehs	HGV	% HGV	All vehs	HGV	% HGV	All vehs	HGV	% HGV
13	Perimeter Road East	1321	106	8%	1255	158	13%	1282	203	16%	758	80	11%
15	Old Brighton Road South (North)	617	23	4%	586	28	5%	447	27	6%	1052	17	2%
25	Woodcote Side	528	10	2%	1194	15	1%	156	9	6%	404	8	2%
26	Woodcote Green Road (east)	321	15	5%	972	20	2%	14	14	100%	207	14	7%
27	Woodcote Green Road (west)	501	21	4%	1116	25	2%	336	20	6%	599	16	3%
32	Beddington Farm Road (west)	435	15	3%	262	12	5%	304	10	3%	565	12	2%
33	Beddington Farm Road (east)	427	8	2%	254	5	2%	297	3	1%	557	5	1%
67	M23 J9, Northbound slip (South of J9)	1625	17	1%	1495	29	2%	1144	47	4%	1118	22	2%
69	M23 J9, Southbound slip (North of J9)	2702	108	4%	2634	121	5%	2127	94	4%	1857	55	3%

Table 12.9.24: Design Year 2047 Traffic Flows – Net Change (Percentage Change in Brackets)

ID	Road	AM1			AM2			IP			PM		
		All vehs	HGV	% HGV	All vehs	HGV	% HGV	All vehs	HGV	% HGV	All vehs	HGV	% HGV
2	A23 Airport Way	1361 (29%)	44 (25%)	0% (0%)	1545 (35%)	56 (26%)	0% (0%)	993 (25%)	20 (7%)	-1% (-1%)	788 (17%)	22 (17%)	0% (0%)
4	North Terminal Access	808 (30%)	5 (15%)	0% (0%)	725 (28%)	12 (19%)	0% (0%)	332 (14%)	8 (14%)	0% (0%)	156 (7%)	6 (20%)	0% (0%)
5	Longbridge Way	228 (24%)	29 (23%)	0% (0%)	78 (9%)	14 (12%)	0% (0%)	372 (41%)	97 (54%)	2% (2%)	-235 (-20%)	8 (11%)	2% (2%)
6	Northgate Road	-307 (-40%)	11 (11%)	11% (11%)	-277 (-41%)	8 (9%)	11% (11%)	-347 (-48%)	-64 (-37%)	5% (5%)	-501 (-69%)	6 (13%)	18% (18%)
8	Gatwick Way	713 (200%)	108 (318%)	4% (4%)	643 (190%)	96 (218%)	1% (1%)	651 (196%)	99 (283%)	3% (3%)	198 (37%)	49 (306%)	6% (6%)
9	Perimeter Road North (between NT and ST)	-426 (-40%)	-98 (-61%)	-5% (-5%)	-404 (-39%)	-90 (-53%)	-4% (-4%)	-324 (-34%)	-165 (-76%)	-14% (-14%)	-352 (-39%)	-39 (-51%)	-2% (-2%)
13	Perimeter Road East	421 (47%)	19 (22%)	-2% (-2%)	395 (46%)	33 (26%)	-2% (-2%)	300 (31%)	33 (19%)	-1% (-1%)	286 (61%)	17 (27%)	-3% (-3%)
15	Old Brighton Road South (North)	283 (85%)	2 (10%)	-3% (-3%)	259 (79%)	-3 (-10%)	-5% (-5%)	175 (64%)	2 (8%)	-3% (-3%)	330 (46%)	0 (0%)	-1% (-1%)
25	Woodcote Side	22 (4%)	0 (0%)	0% (0%)	347 (41%)	5 (50%)	0% (0%)	1 (1%)	0 (0%)	0% (0%)	7 (2%)	0 (0%)	0% (0%)
26	Woodcote Green Road (east)	22 (7%)	0 (0%)	0% (0%)	345 (55%)	5 (33%)	0% (0%)	0 (0%)	0 (0%)	0% (0%)	8 (4%)	0 (0%)	0% (0%)

ID	Road	AM1			AM2			IP			PM		
		All vehs	HGV	% HGV	All vehs	HGV	% HGV	All vehs	HGV	% HGV	All vehs	HGV	% HGV
27	Woodcote Green Road (west)	19 (4%)	1 (5%)	0% (0%)	354 (46%)	5 (25%)	0% (0%)	3 (1%)	0 (0%)	0% (0%)	12 (2%)	0 (0%)	0% (0%)
32	Beddington Farm Road (west)	36 (9%)	0 (0%)	0% (0%)	-23 (-8%)	0 (0%)	0% (0%)	11 (4%)	0 (0%)	0% (0%)	195 (53%)	1 (9%)	-1% (-1%)
33	Beddington Farm Road (east)	36 (9%)	1 (14%)	0% (0%)	-23 (-8%)	0 (0%)	0% (0%)	11 (4%)	0 (0%)	0% (0%)	195 (54%)	2 (67%)	0% (0%)
67	M23 J9, Northbound slip (South of J9)	305 (23%)	5 (42%)	0% (0%)	371 (33%)	9 (45%)	0% (0%)	305 (36%)	5 (12%)	-1% (-1%)	301 (37%)	4 (22%)	0% (0%)
69	M23 J9, Southbound slip (North of J9)	447 (20%)	17 (19%)	0% (0%)	455 (21%)	22 (22%)	0% (0%)	505 (31%)	13 (16%)	-1% (-1%)	392 (27%)	13 (31%)	0% (0%)

12.9.147 The above table shows a selection of links which will experience more than a 30% increase in traffic flows for one or more peak periods. The following links are expected to have an increase of 30% to 60% (low impact).

- Link 2: A23 Airport Way (negligible sensitivity) in the AM2 period.
- Link 4: North Terminal Access (low sensitivity) in the AM1 period.
- Link 5: Longbridge Way (low sensitivity) in the IP period.
- Link 8: Gatwick Way (low sensitivity) in the PM period.
- Link 15: Old Brighton Road South, northern section (low sensitivity) in the PM period
- Link 25: Woodcote Side (medium sensitivity) in the AM2 period.
- Links 26 to 27: Woodcote Green Road (medium sensitivity) in the AM2 period.
- Link 32-33: Beddington Farm Road (low sensitivity) in the PM period.
- Link 67: M23 J9, Northbound slip (South of J9), (negligible sensitivity) in the AM2, IP and PM periods.
- Link 69: M23 J9, Southbound slip (North of J9), (negligible sensitivity) in the IP period.

12.9.148 For the above links with negligible to low sensitivity, the severance effect is **negligible adverse**. For the links with medium sensitivity, the severance effect is **minor adverse.**

12.9.149 The following links are expected to have an increase of 60% to 90% (medium impact).

- Link 6: Northgate Road (negligible sensitivity) in the AM1 period.
- Link 13: Perimeter Road East (low sensitivity) in the PM period.
- Link 15: Old Brighton Road South, northern section (low sensitivity) in the AM1, AM2 and IP periods.

12.9.150 The above links would have a **minor adverse** severance effect.

12.9.151 The following link is expected to have an increase of more than 90% (high impact).

- Link 8: Gatwick Way (low sensitivity) in the AM1, AM2 and IP periods.

12.9.152 The above link would have a **minor adverse** severance effect. It should be noted that the links that experience the highest increase in traffic flows are associated with the airport access which are considered to have negligible to low pedestrian and cyclist sensitivity.

12.9.153 In addition to the above, two links are expected to experience a reduction 30% to 60% (low beneficial impact):

- Link 6: Northgate Road (negligible sensitivity) in the IP period; and
- Link 9: Perimeter Road North between the terminals (low sensitivity) in the IP period.

12.9.154 Northgate Road would have **negligible beneficial** effect in the IP period but a minor adverse effect in the AM1 period as set out above. Perimeter Road North would have a **minor beneficial** severance effect.

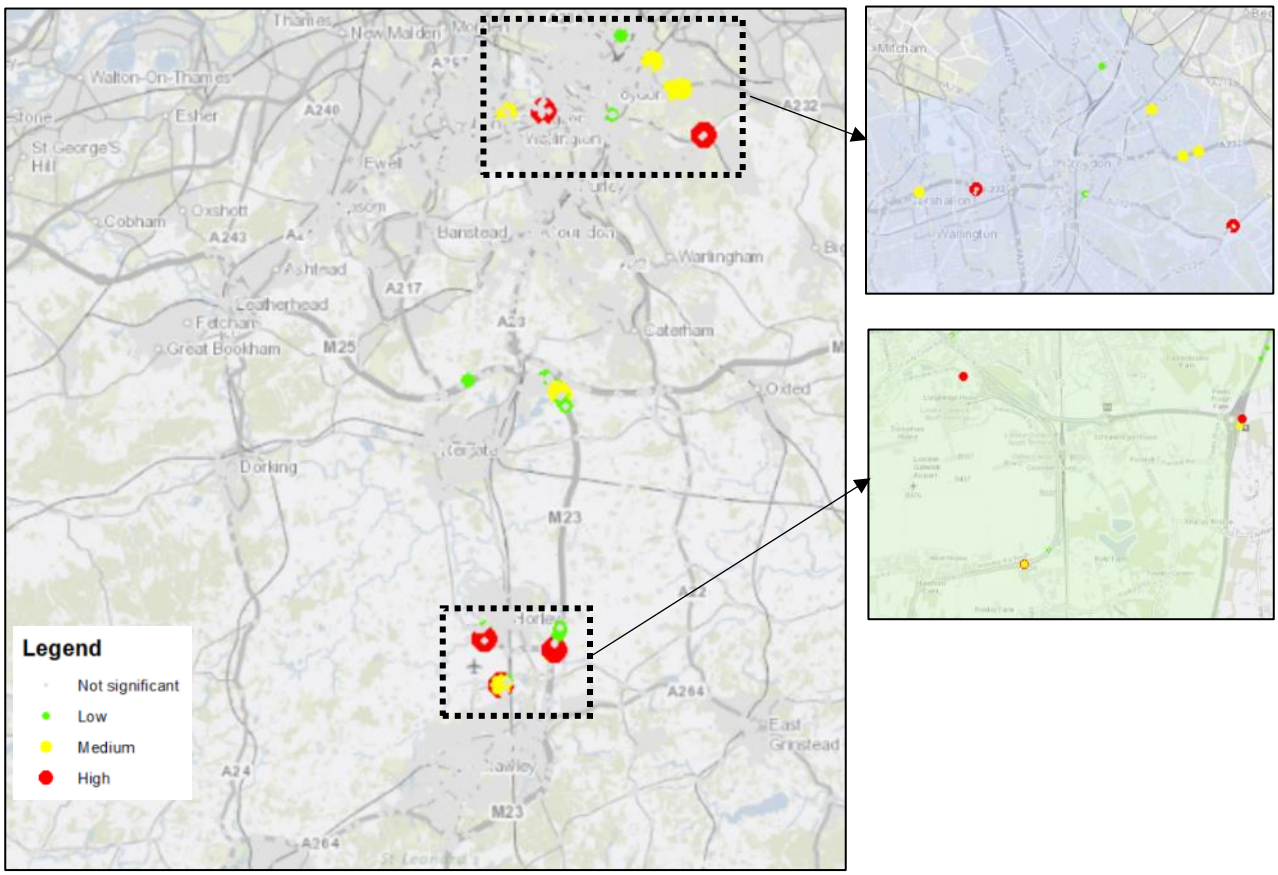
12.9.155 All other changes in traffic flows are below 30% and the magnitude of impact is considered to be negligible. The sensitivity of the pedestrians and cyclists along the highway links range from negligible to medium.

12.9.156 Overall, the effect of the Project on severance can be considered to be **minor adverse**.

Driver Delay

12.9.157 The following diagram shows the magnitude of impact for driver delay for junctions where the V/C is over 85%. The diagram shows driver delay for all time periods assessed and any overlaps in colours indicate different magnitudes of impact by time period. The highest magnitude of impact for each junction is considered.

Diagram 12.9.17: 2047 Driver Delay Magnitude of Impact (all assessment time periods)



12.9.158 The above shows that most junctions (over 1,000) have no significant or low magnitude of impact in terms of delay. Car driver and passenger sensitivity is considered to be medium for junctions where the V/C is over 85%. For the junctions with no significant delays, the driver delay effect is **negligible**. For those with a low magnitude of impact, the driver delay is **minor adverse**.

12.9.159 There are eight junctions which are shown to have a medium magnitude of delay. Five junctions are identified with a high magnitude of delay, two are located in the Croydon area[6] and three are located near the airport at the A23 London Road / Gatwick Road roundabout, M23 J9 and an internal junction along Perimeter Road North. For these junctions, the driver delay effect is considered to be **moderate adverse**. Further information is contained in the modelling annex to the PTAR (Appendix 12.9.1) on overall journey times to consider driver delays in more detail, and work will be undertaken to verify model findings as well as to identify mitigation measures (if

[6] Junctions in the Croydon area require review and adjustment in the next phase of modelling for ES (see paragraph 12.4.13)

required) for the development consent. Any significant effects on driver delay will be mitigated and it is expected that the residual effect will be **minor adverse**.

Pedestrian and Cyclist Delay

12.9.160 The highway improvements included as part of the Project would change some pedestrian and cycle routes at the North Terminal, South Terminal and Longbridge Roundabout junctions. The works are expected to improve pedestrian and cycle accessibility and these movements are separated from general traffic where practicable. The proposed changes to the Longbridge Roundabout would retain pedestrian crossings on all arms. Within the terminal forecourts, the pedestrian crossings would be retained. In addition, pedestrian and cycling improvements have been identified as part of the Gatwick Airport's Capital Investment Plan, which includes new linkages. Further details are contained in the PTAR (Appendix 12.9.1).

12.9.161 The magnitude of impact is considered to be negligible to low, the sensitivity of receptors along the highway routes range from negligible to medium. Overall, it is expected that the changes to pedestrian and cycle delay would be **negligible**, and the junctions with proposed highway improvements with the Project would have **minor beneficial** effects.

Pedestrian and Cyclist Amenity

12.9.162 The threshold for an effect on pedestrian and cyclist amenity is when the traffic flows have doubled. As shown in Table 12.9.24, Old Brighton Road South, Perimeter Road East, Longbridge Way, Northgate Road, Perimeter Road North and Gatwick Way are expected to experience a doubling or more in flows. The magnitude of impact of these links is considered to be medium. These are airport estate roads with negligible to low sensitivity in terms of pedestrians and cyclists. The effect of the Project on pedestrian and cyclist amenity can be considered to be **minor adverse**.

12.9.163 The traffic composition can also affect pedestrian and cyclist amenity. The traffic flows contained in Appendix 12.9.2 shows that the highest increase in the percentage of HGVs (number of HGVs divided by total vehicle number) are expected on the airport estate roads. The magnitude of this impact can be considered to be low to medium. The sensitivity along these roads is considered to be negligible to low. The effect of the Project on amenity is considered to be **minor adverse**.

Accidents and Safety

12.9.164 The design of the highway improvements would separate through-traffic from the North Terminal and South Terminal roundabouts. This would reduce traffic flows through the junction and reduce the risks of conflict and this is considered to be beneficial. The magnitude of impact is considered to be negligible to low.

12.9.165 The sensitivity of receptors in terms of pedestrians and cyclists along the highway links range from negligible to medium. The effect of accidents and safety on pedestrians and cyclist is considered to be **minor beneficial** where highway improvements as part of the Project are proposed, and **negligible to minor adverse** on all other roads.

12.9.166 The sensitivity of receptors in terms of car drivers and passengers ranges from low to medium. The effect of accidents and safety on car drivers and passengers is considered to be **minor beneficial** at the junctions where highway improvements are proposed, and **negligible** for all other roads.

Hazardous Loads

12.9.167 The proposed changes to the highway network are expected to improve the safety of general traffic. The magnitude of impact is expected to be negligible and the sensitivity of receptors is considered to be negligible. The effect on hazardous loads is considered to be **negligible beneficial.**

Effects on Public Transport Amenity

12.9.168 To assess the effect of the Project on public transport amenity, this section considers the impact on passenger crowding on rail services and in Gatwick Airport railway station.

Crowding on Rail Services

AM Peak (0700-0900)

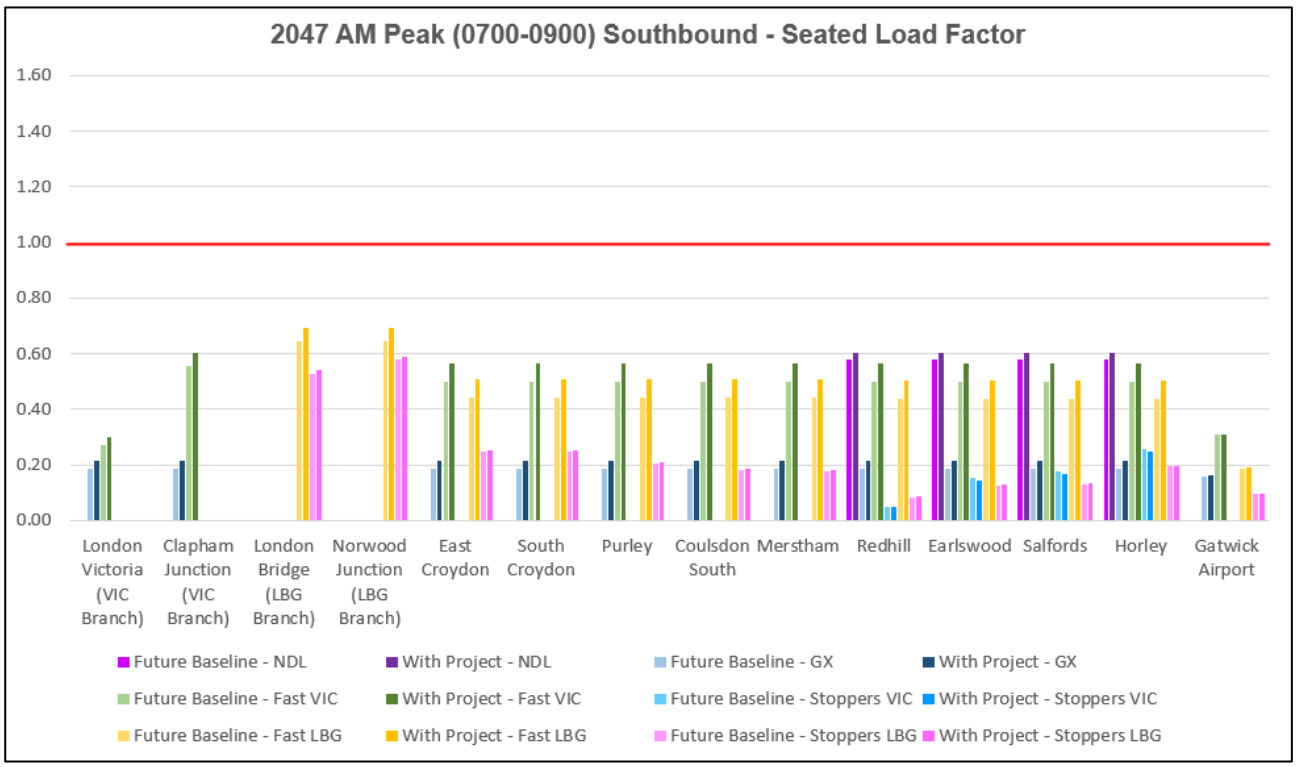
12.9.169 Crowding has been assessed based on line loading in both directions in the AM and PM peaks, and detailed data is contained in the PTAR. In the AM peak, the highest increase in rail passengers is actually in the southbound direction, from London to Gatwick. This indicates that Gatwick growth means better use of contra-peak rail capacity. Table 12.9.25 provides a summary of the increase in line loading by station in the southbound direction.

Table 12.9.25: 2047 AM Southbound Line Loading Capacity Assessment

Station	2047 AM Peak Southbound (0700-0900)													
	Change in Line Loading on Departure							Percentage Change						
	NDL	GX	Fast VIC	Stoppers VIC	Fast LBG	Stoppers LBG	Total	NDL	GX	Fast VIC	Stoppers VIC	Fast LBG	Stoppers LBG	Total
London Victoria (VIC Branch)	-	129	162	-	-	-	**291**	-	16%	10%	-	-	-	**12%**
Clapham Junction (VIC Branch)	-	129	276	-	-	-	**405**	-	16%	8%	-	-	-	**10%**
London Bridge (LBG Branch)	-	-	-	-	523	59	**582**	-	-	-	-	7%	2%	**6%**
Norwood Junction (LBG Branch)	-	-	-	-	523	48	**571**	-	-	-	-	7%	2%	**6%**
East Croydon	-	129	378	-	718	18	**1243**	-	16%	13%	-	15%	1%	**13%**
South Croydon	-	129	378	-	718	18	**1243**	-	16%	13%	-	15%	1%	**13%**
Purley	-	129	378	-	718	16	**1241**	-	16%	13%	-	15%	2%	**13%**
Coulsdon South	-	129	378	-	718	17	**1242**	-	16%	13%	-	15%	2%	**13%**
Merstham	-	129	378	-	718	17	**1243**	-	16%	13%	-	15%	2%	**13%**
Redhill	22	129	378	3	717	18	**1268**	4%	16%	13%	6%	15%	4%	**13%**
Earlswood	22	129	378	-11	717	12	**1247**	4%	16%	13%	-6%	15%	2%	**13%**
Salfords	22	129	378	-11	717	12	**1247**	4%	16%	13%	-6%	15%	2%	**13%**
Horley	22	129	378	-11	717	11	**1246**	4%	16%	13%	-4%	15%	1%	**12%**
Gatwick Airport	-	24	22	-	30	10	**85**	-	3%	1%	-	1%	2%	**2%**

12.9.170 The above table shows that on the rail services being assessed, the Project contributes an additional 1,270 passengers approx. Most of these passengers are expected to use the fast train services from London Victoria and London Bridge. The increase in passengers represents a 13% to 15% increase in passengers on the fast services, and 16% on Gatwick Express. To assess the impact on crowding, Diagram 12.9.18 shows the seated load factor assessment.

Diagram 12.9.18: 2047 AM Southbound Seated Load Factor



12.9.171 The above diagram shows that the increase in passengers in the southbound direction will increase the seated load factor across all the lines assessed, but there is still seating available for passengers. The highest seated load factor is up to around 0.7, which means that three out of ten seats will be available.

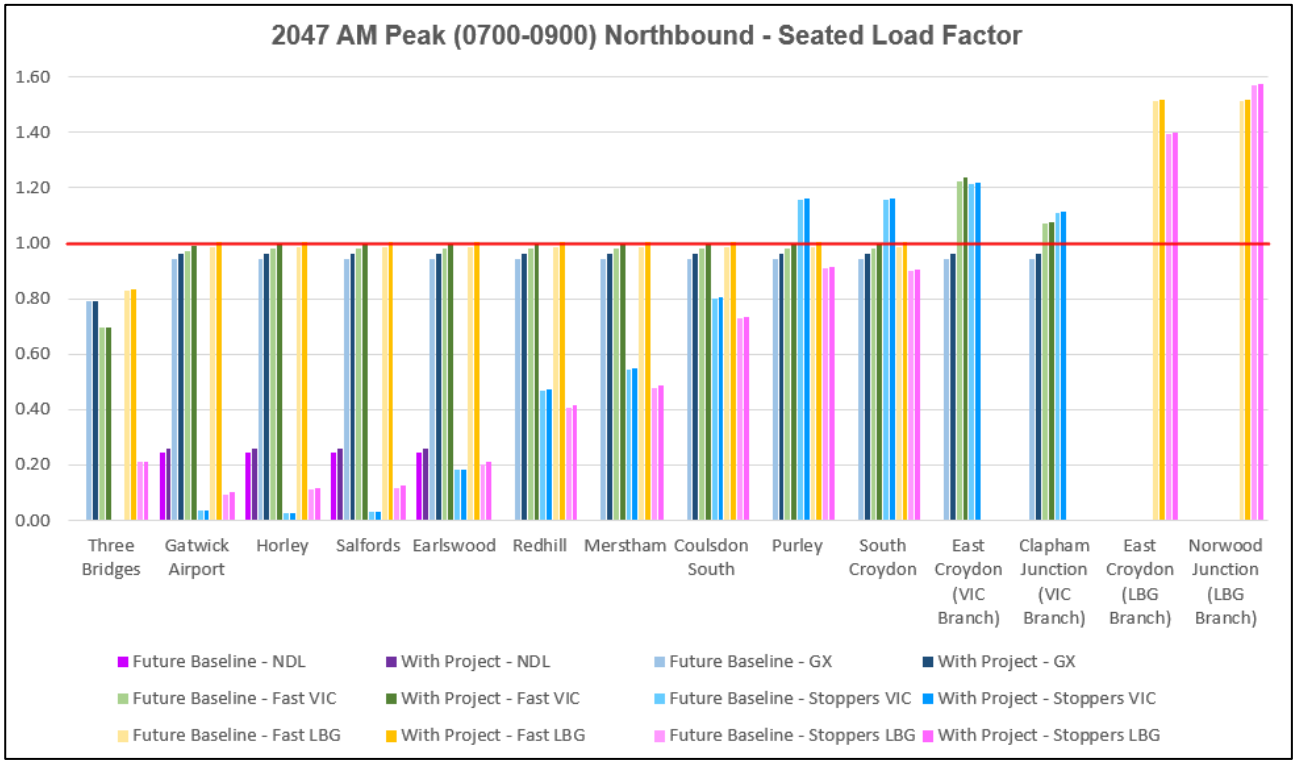
12.9.172 The line loading in the northbound direction has been assessed. This is the peak rail network direction in the AM peak and Table 12.9.26 provides a summary of the increase in line loadings in this direction.

Table 12.9.26: 2047 AM Northbound Line Loading

Station	AM Peak Northbound (0700-0900)													
	Change in Line Loading on Departure							Percentage Change						
	NDL	GX	Fast VIC	Stoppers VIC	Fast LBG	Stoppers LBG	Total	NDL	GX	Fast VIC	Stoppers VIC	Fast LBG	Stoppers LBG	Total
Three Bridges	-	-6	2	-	40	10	**47**	-	0%	0%	-	0%	1%	**0%**
Gatwick Airport	17	70	147	1	215	44	**493**	7%	2%	2%	1%	2%	7%	**2%**
Horley	17	70	145	1	215	45	**493**	7%	2%	2%	2%	2%	6%	**2%**
Salfords	17	70	145	2	215	45	**493**	7%	2%	2%	2%	2%	6%	**2%**
Earlswood	17	70	145	12	215	55	**514**	7%	2%	2%	2%	2%	4%	**2%**
Redhill	-	70	145	16	215	40	**486**	-	2%	2%	1%	2%	1%	**2%**
Merstham	-	70	145	16	215	39	**484**	-	2%	2%	1%	2%	1%	**2%**
Coulsdon South	-	70	145	16	215	37	**483**	-	2%	2%	1%	2%	1%	**2%**
Purley	-	70	145	16	215	36	**481**	-	2%	2%	0%	2%	1%	**1%**
South Croydon	-	70	145	16	215	35	**480**	-	2%	2%	0%	2%	1%	**1%**
East Croydon (VIC Branch)	-	70	101	14	-	-	**185**	-	2%	1%	0%	-	-	**1%**
Clapham Junction (VIC Branch)	-	70	21	7	-	-	**99**	-	2%	0%	0%	-	-	**1%**
East Croydon (LBG Branch)	-	-	-	-	88	22	**110**	-	-	-	-	1%	0%	**0%**
Norwood Junction (LBG Branch)	-	-	-	-	88	26	**115**	-	-	-	-	1%	0%	**0%**

12.9.173 The above table shows that the Project adds up to 520 passengers to rail services in this direction, which represents an overall increase of 2%. Diagram 12.9.19 shows the seated load factor assessment for the AM peak northbound direction services.

Diagram 12.9.19: 2047 AM Northbound Seated Load Factor



12.9.174 The above diagram shows that between Three Bridges and Coulsdon South, the seating capacity is reached but seats are available for all passengers. Seating capacity is exceeded north of Purley, owing to background commuter flows into London, and standing capacity has therefore been assessed as shown in Table 12.9.27.

Table 12.9.27: 2047 AM Northbound Standing Capacity Assessment

Station	AM Peak Northbound (0700-0900) - Percentage of Standing Capacity Occupied													
	Future Baseline 2047							Future Baseline 2047 + Project (% change)						
	NDL	GX	Fast VIC	Stoppers VIC	Fast LBG	Stoppers LBG	Total	NDL	GX	Fast VIC	Stoppers VIC	Fast LBG	Stoppers LBG	Total
Purley	-	0%	0%	26%	0%	0%	**1%**	-	0% (0.0%)	0% (0.0%)	27% (0.8%)	0% (0.3%)	0% (0.0%)	**2% (0.2%)**
South Croydon	-	0%	0%	26%	0%	0%	**1%**	-	0% (0.0%)	0% (0.0%)	27% (0.8%)	0% (0.3%)	0% (0.0%)	**2% (0.2%)**
East Croydon (VIC Branch)	-	0%	37%	36%	-	-	**7%**	-	0% (0.0%)	39% (2.2%)	37% (0.7%)	-	-	**7% (0.3%)**
Clapham Junction (VIC Branch)	-	0%	12%	19%	-	-	**2%**	-	0% (0.0%)	12% (0.5%)	19% (0.4%)	-	-	**3% (0.1%)**
East Croydon (LBG Branch)	-	-	-	-	39%	24%	**23%**	-	-	-	-	40% (0.6%)	25% (0.2%)	**24% (0.3%)**
Norwood Junction (LBG Branch)	-	-	-	-	39%	35%	**26%**	-	-	-	-	40% (0.6%)	35% (0.2%)	**27% (0.3%)**

12.9.175 On average over the two-hour AM peak period, the highest percentage of standing capacity occupied is 39% and 40% on the fast services to London Victoria and London Bridge, which occurs north of East Croydon. Whilst services north of East Croydon are therefore busy, the Project will not significantly increase the percentage of standing capacity occupied when compared the future baseline 2047 situation, with the highest increase being 2.2% on the fast services into London Bridge.

PM Peak (1600-1900)

12.9.176 In the PM peak, there is an increase in rail passengers in the northbound direction, from Gatwick to London.

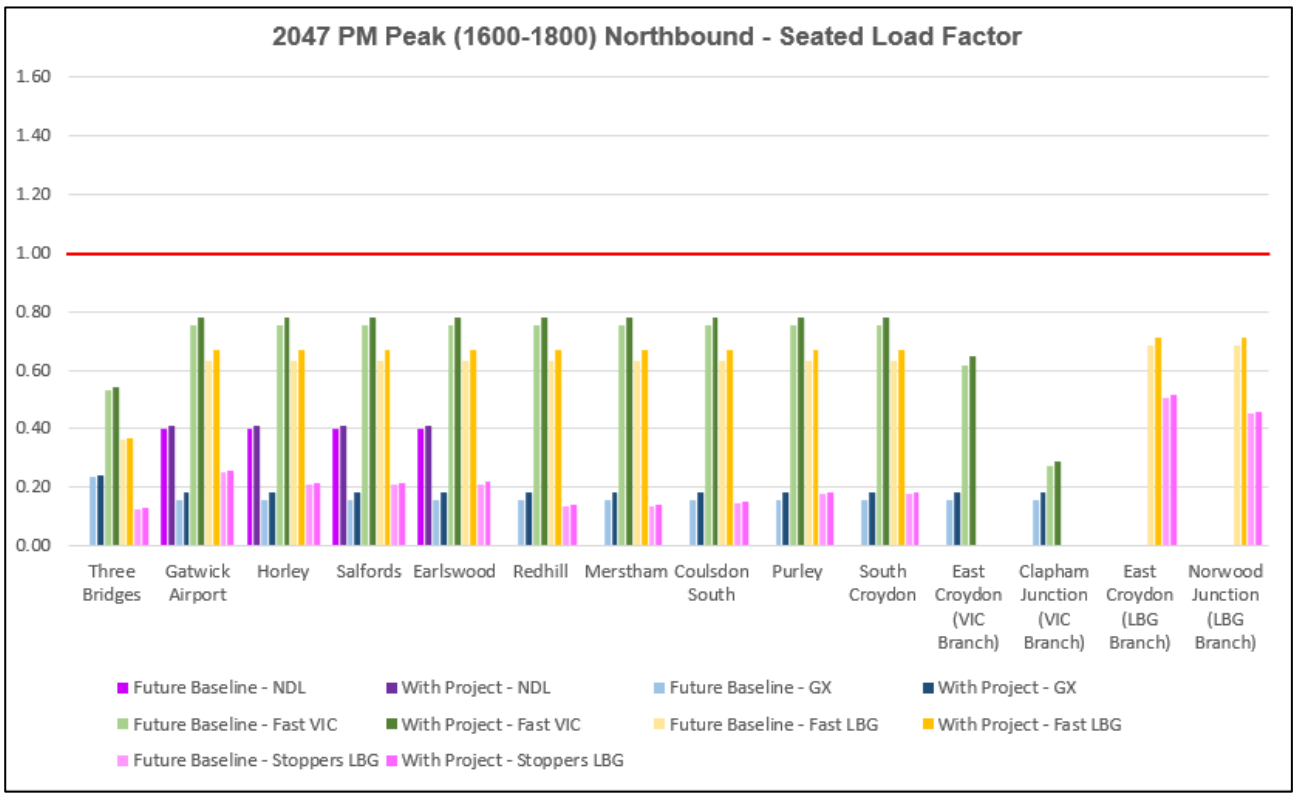
12.9.177 Table 12.9.28 provides a summary of the increase in line loading by station in the off-peak northbound direction, again demonstrating the operational value for money that Gatwick growth provides.

Table 12.9.28: 2047 PM Northbound Line Loading Capacity Assessment

Station	2047 PM Peak Northbound (1600-1900)													
	Change in Line Loading on Departure							Percentage Change						
	NDL	GX	Fast VIC	Stoppers VIC	Fast LBG	Stoppers LBG	Total	NDL	GX	Fast VIC	Stoppers VIC	Fast LBG	Stoppers LBG	Total
Three Bridges	-	23	72	-	49	26	**170**	-	2%	2%	-	2%	2%	**2%**
Gatwick Airport	11	130	224	-	329	77	**770**	3%	17%	4%	-	6%	3%	**5%**
Horley	11	130	224	-	329	77	**770**	3%	17%	4%	-	6%	4%	**5%**
Salfords	11	130	224	-	329	79	**773**	3%	17%	4%	-	6%	4%	**5%**
Earlswood	11	130	224	-	329	80	**774**	3%	17%	4%	-	6%	4%	**5%**
Redhill	-	130	224	-	329	57	**740**	-	17%	4%	-	6%	4%	**6%**
Merstham	-	130	224	-	329	56	**739**	-	17%	4%	-	6%	4%	**6%**
Coulsdon South	-	130	224	-	329	54	**737**	-	17%	4%	-	6%	4%	**6%**
Purley	-	130	224	-	329	53	**736**	-	17%	4%	-	6%	3%	**5%**
South Croydon	-	130	224	-	329	53	**736**	-	17%	4%	-	6%	3%	**5%**
East Croydon (VIC Branch)	-	130	216	-	-	-	**345**	-	17%	5%	-	-	-	**6%**
Clapham Junction (VIC Branch)	-	130	90	-	-	-	**220**	-	17%	4%	-	-	-	**8%**
East Croydon (LBG Branch)	-	-	-	-	230	90	**320**	-	-	-	-	4%	2%	**3%**
Norwood Junction (LBG Branch)	-	-	-	-	230	89	**319**	-	-	-	-	4%	2%	**3%**

12.9.178 The above table shows that on the rail services being assessed, the Project contributes an additional 770 passengers approx. Most of these passengers are expected to use the fast train services to London Victoria and London Bridge. The increase in passengers represents a 4% to 6% increase in passengers on the fast services, and 17% on the Gatwick Express. To assess the impact on crowding, Diagram 12.9.20 shows the seated load factor assessment.

Diagram 12.9.20: 2047 PM Northbound Seated Load Factor



12.9.179 The above diagram shows that the increase in passengers in the northbound direction will increase the seated load factor across all the lines assessed, although there is still seating available for passengers. The highest seated load factor is up to 0.8, which means that two out of ten seats will still be available.

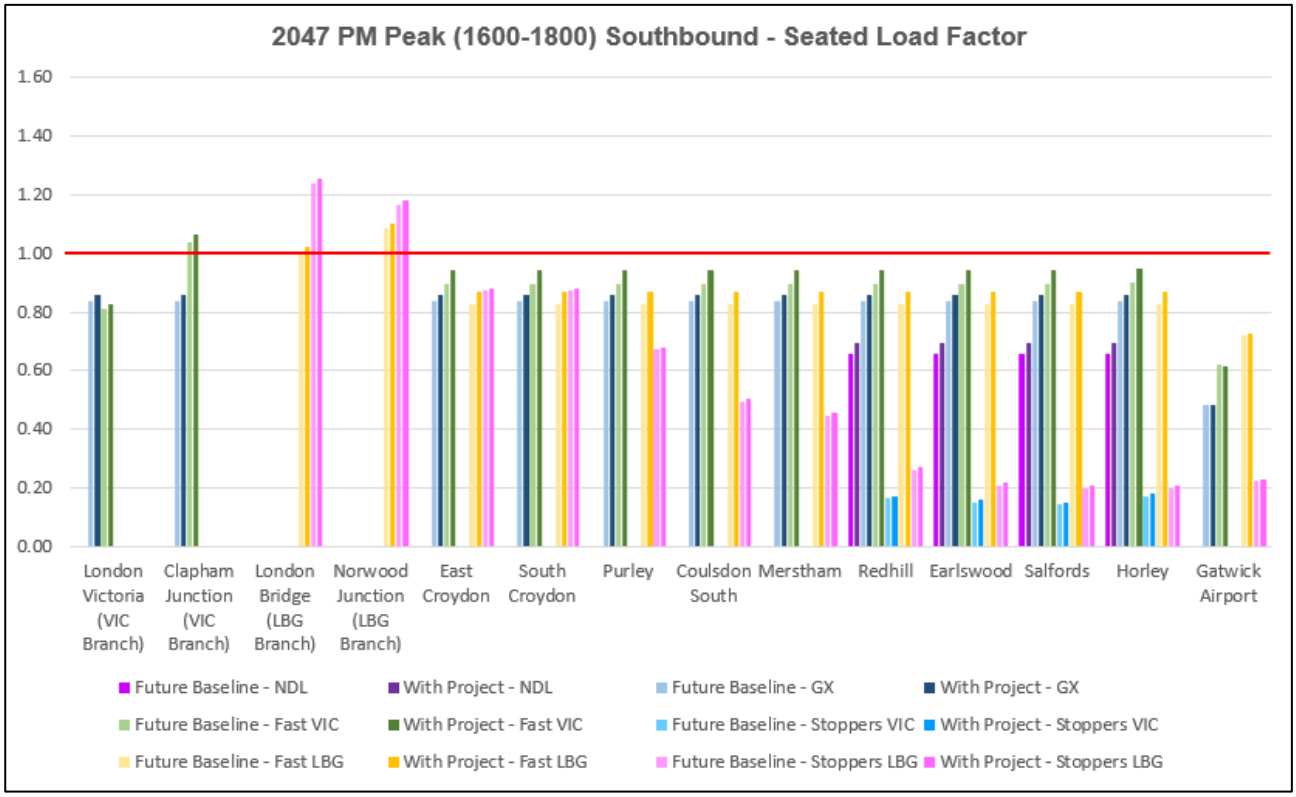
12.9.180 The line loading in the southbound direction has been examined. This is the peak rail network direction in the PM peak and Table 12.9.29 provides a summary of the increase in line loadings in this direction.

Table 12.9.29: 2047 PM Southbound Line Loading

Station	2047 PM Peak Southbound (1600-1900)													
	Change in Line Loading on Departure							Percentage Change						
	NDL	GX	Fast VIC	Stoppers	Fast LBG	Stoppers	Total	NDL	GX	Fast VIC	Stoppers	Fast LBG	Stoppers	Total
London Victoria (VIC Branch)	-	124	107	-	-	-	**231**	-	3%	2%	-	-	-	**2%**
Clapham Junction (VIC Branch)	-	124	181	-	-	-	**305**	-	3%	2%	-	-	-	**2%**
London Bridge (LBG Branch)	-	-	-	-	150	90	**240**	-	0%	0%	-	1%	1%	**1%**
Norwood Junction (LBG Branch)	-	-	-	-	172	93	**264**	-	0%	0%	-	2%	1%	**1%**
East Croydon	-	124	365	-	435	32	**956**	-	3%	5%	-	5%	1%	**4%**
South Croydon	-	124	365	-	435	32	**956**	-	3%	5%	-	5%	1%	**4%**
Purley	-	124	365	-	435	34	**958**	-	3%	5%	-	5%	1%	**4%**
Coulsdon South	-	124	365	-	435	36	**960**	-	3%	5%	-	5%	1%	**4%**
Merstham	-	124	365	-	435	37	**961**	-	3%	5%	-	5%	1%	**4%**
Redhill	37	124	365	7	435	62	**1029**	5%	3%	5%	4%	5%	4%	**5%**
Earlswood	37	124	365	7	435	61	**1028**	5%	3%	5%	4%	5%	5%	**5%**
Salfords	37	124	365	7	435	59	**1026**	5%	3%	5%	4%	5%	5%	**5%**
Horley	37	124	365	7	435	59	**1027**	5%	3%	5%	4%	5%	5%	**5%**
Gatwick Airport	-	-4	-45	-	52	19	**22**	-	0%	-1%	-	1%	1%	**0%**

12.9.181 The above table shows that the Project adds around 1030 passengers to rail services in this direction, which represents an overall increase of 5%. Diagram 12.9.21 shows the seated load factor assessment for the PM peak southbound direction services.

Diagram 12.9.21: 2047 PM Southbound Seated Load Factor



12.9.182 The above diagram shows that trains departing London Bridge in the PM peak are mostly occupied beyond their seated capacity. However, on arrival at East Croydon, sufficient passengers alight such that seats become available indicating spare capacity. For the lines serving stations where seating capacity is exceeded, standing capacity has been assessed and this is shown in Table 12.9.30.

Table 12.9.30: 2047 PM Southbound Standing Capacity Assessment

Station	AM Peak Northbound (0700-0900) - Percentage of Standing Capacity Occupied													
	Future Baseline 2047							Future Baseline 2047 + Project (% change)						
	NDL	GX	Fast VIC	Stoppers VIC	Fast LBG	Stoppers LBG	Total	NDL	GX	Fast VIC	Stoppers VIC	Fast LBG	Stoppers LBG	Total
Clapham Junction (VIC Branch)	-	0%	7%	-	-	-	**1%**	-	0% (0.0%)	11% (4.0%)	-	-	-	**1% (0.5%)**
London Bridge (LBG Branch)	-	-	-	-	1%	15%	**4%**	-	-	-	-	2% (1.0%)	16% (0.9%)	**5% (0.7%)**
Norwood Junction (LBG Branch)	-	-	-	-	6%	10%	**5%**	-	-	-	-	7% (1.1%)	11% (1.0%)	**6% (0.8%)**

12.9.183 On average, over the two-hour PM peak period, the highest percentage of standing capacity occupied in the with Project scenario is 16% in the future baseline on fast services out of London Bridge, which indicates that rail services are very busy but suggests that there is some spare standing capacity available. The Project will not significantly increase the percentage of standing capacity occupied when compared to the future baseline 2047 situation, with the highest increase in standing capacity occupied as a result of Gatwick passengers being 4.0% on fast services out of London Victoria.

Summary on Rail Crowding

12.9.184 A summary of rail crowding by peak hour and direction is as follows :

- **AM Peak** – The highest increase in line loading as a result of the Project is up to 16%. This is on the southbound services, where there is sufficient number of spare seats for passengers. On the northbound services, there will be passengers standing on some services north of Purley. The highest percentage of standing capacity occupied on train services is around 40%, indicating busy trains into London. However, the Project only accounts for a 2.2% change in standing, with the remainder being as a result of high commuter flows into London. The overall magnitude of impact of the Project on rail capacity is therefore considered to be low.
- **PM Peak** - The highest increase in line loading as a result of the Project is up to 17%. This is on the contra-peak northbound services, where there is sufficient number of spare seats for passengers. On the southbound services, there will be passengers standing on some services out of London, with seats only becoming available at Clapham Junction and East Croydon. The highest percentage of standing capacity occupied on a service is 18%, with the Project accounting for a 4% change in standing. The overall magnitude of impact is therefore considered to be low.

12.9.185 It should be noted that the Project does not assess committed improvements proposed by the rail industry as mitigation of its effects, instead these improvements are applied in the future baseline, against which the Project is being assessed. Moreover, the last Control Period considered for improvements is CP7 (which is to 2029) so the modelling currently assumes no further improvements between 2029 and 2047, which is considered a conservative assumption. The overall magnitude of impact is considered to be low and the sensitivity of receptors in terms of public transport capacity is considered to be low to medium. Any effects to changes in crowding levels for 2047 are therefore anticipated to be **minor adverse**, which is not significant.

Crowding in Station

12.9.186 The assessment has also considered crowding in the Gatwick railway station. As set out in paragraph 12.6.65, the assessment assumes that the capacity enhancements associated with the Station improvement will be complete by the start of the assessment period.

12.9.187 Diagram 12.9.22 and Diagram 12.9.23 show the Level of Service performance for circulation at the concourse level of the station for the peak hour in the AM and PM peak modelled periods.

Diagram 12.9.22: 2047 Concourse LoS (AM Peak Hour, 08:00 – 09:00)

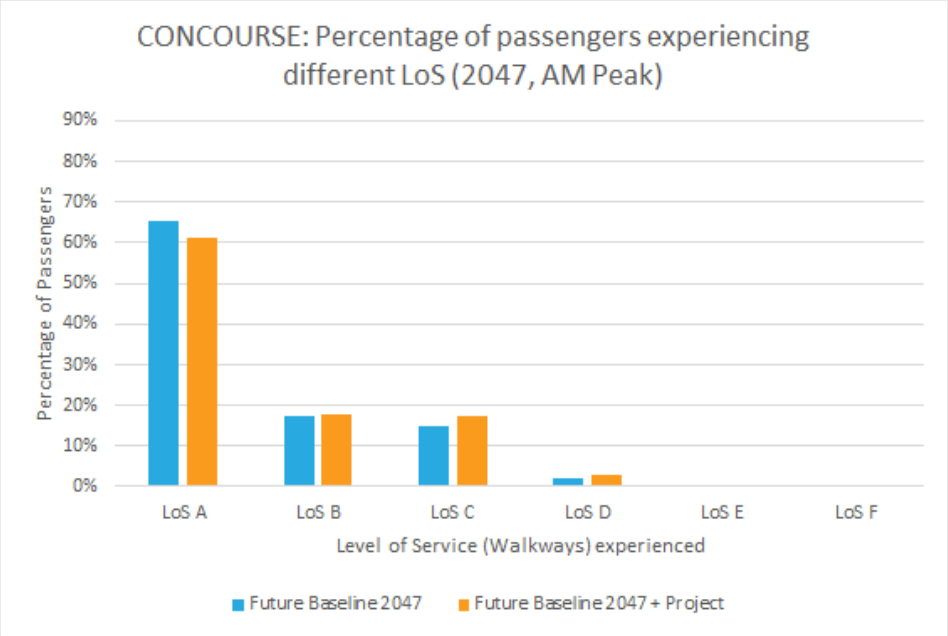
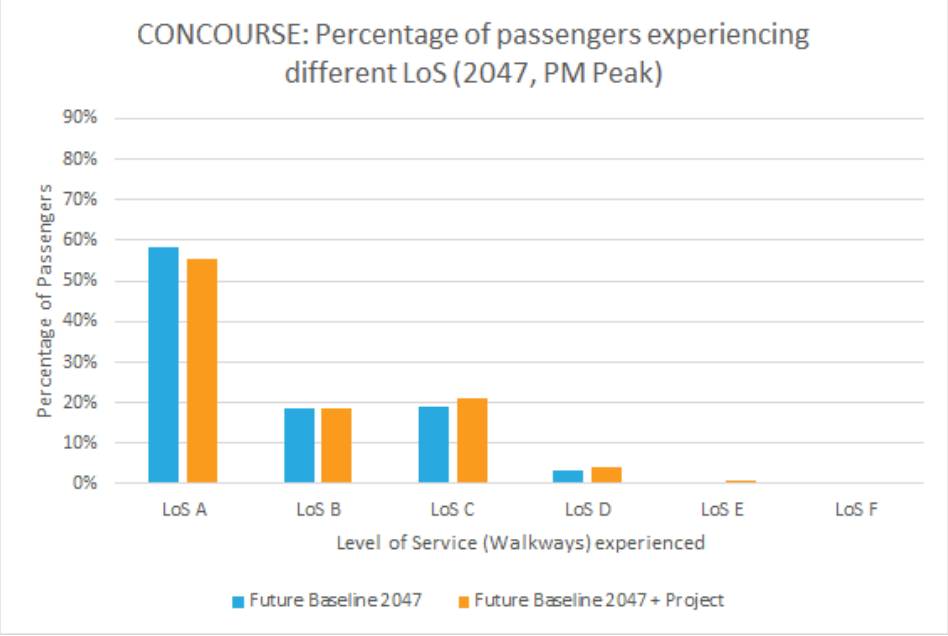


Diagram 12.9.23: 2047 Concourse LoS (PM Peak Hour, 17:00 – 18:00)



12.9.188 The percentage of passengers experiencing different Levels of Service varies but the assessment shows that station performance at concourse level is expected to be LoS C or better. This represents a low passenger sensitivity to increases in crowding.

12.9.189 The PM peak period shows a very small percentage of passengers (1%) would experience a one level change to LoS E with the Project. This is expected to be the worst case and this magnitude of impact is considered as low**.**

12.9.190 The Level of Service performance for queuing and wating for the station platforms is shown in Diagram 12.9.24 and Diagram 12.9.25, excluding escalator elements.

Diagram 12.9.24: 2047 Platforms LoS (AM Peak Hour, 08:00 – 09:00)

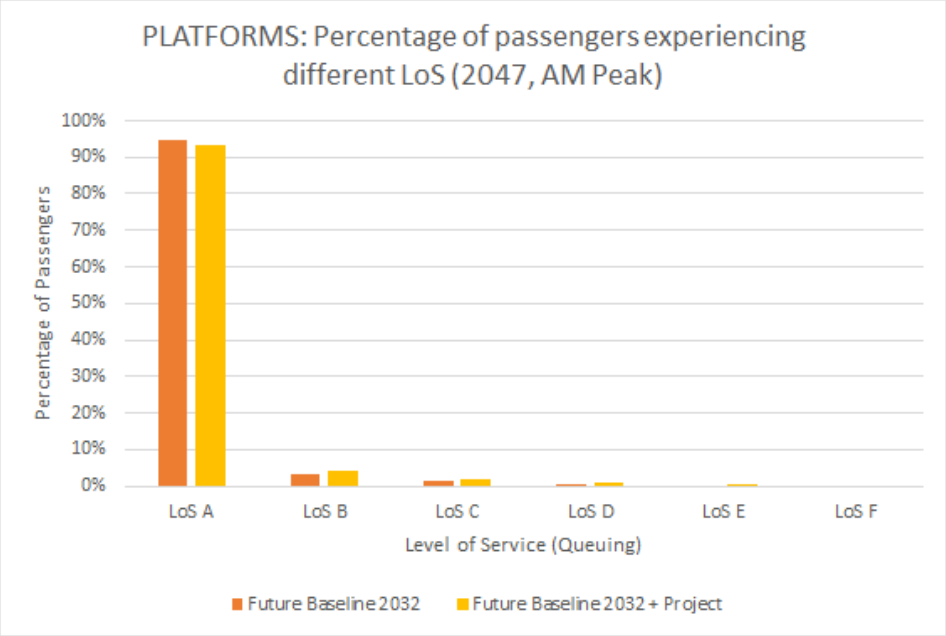
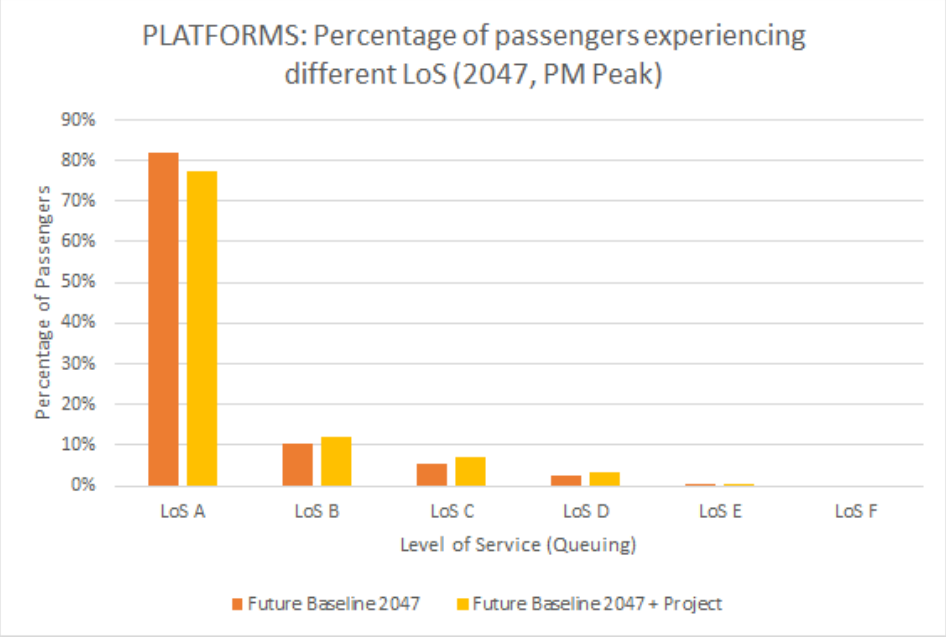


Diagram 12.9.25: 2047 Platforms LoS (PM Peak Hour, 17:00 – 18:00)



12.9.191 The percentage of passengers experiencing different Level of Service ranges varies but the assessment shows that the station performance at platform level would generally be LoS C or better, with a small percentage of passengers experiencing LoS D and E in the peak hour. In fact, most passengers will experience LoS A for 75% (PM peak) to 90% (AM peak) of the time.

12.9.192 Therefore, when considering the full assessment across the station, both the concourse and platforms, and both peak hours, the magnitude of impact of the Project on crowding is considered to be negligible to low. The sensitivity of receptors is considered to be low given that most passengers experience LoS C or better. The overall effect on changes in crowding levels for the railway station with the Project are considered **negligible adverse**.

Bus and Coach

12.9.193 Given the adaptability of bus and coach provision, crowding on bus and coach services has not been assessed explicitly within this PEIR assessment. However, the final assessment for the ES to accompany the application for development consent will include service frequency and quality as a measure of public transport amenity

Further Mitigation and Future Monitoring

12.9.194 There are 13 junctions which have been identified to have moderate adverse effect in terms of driver delay. The junctions in Croydon relate to model convergence which requires review and further adjustment (see paragraph 12.4.13). Further information is contained in the modelling annex to the PTAR (Appendix 12.9.1) on overall journey times to consider driver delays in more detail. Work will be undertaken to verify model findings as well as to identify mitigation measures if required for the development consent application. No further mitigation or additional monitoring is proposed other than that adopted as part of the Project (as set out in Section 12.8).

Significance of Effects

12.9.195 Potential significant effect has been identified for 13 junctions in terms of driver delay. Further work will be undertaken to verify model findings as well as to identify mitigation measures if required. No other significant effects have been identified for this assessment year. No further mitigation or monitoring is required; therefore, the significance of effects would remain as presented above.

12.10. Potential Changes to the Assessment as a Result of Climate Change

12.10.1 Climate change is not considered to have a direct impact on the traffic and transport topics assessed. However, changing travel behaviour in response to climate change concerns is expected to result in a long-term shift to more sustainable modes of travel, lower emission vehicles and advances in technology which in turn will support improved telecommuting and flexible working. This may reduce the scale of background traffic flows and travel demand during peak hours.

12.10.2 A reduction in vehicle emissions and traffic volumes would result in an improvement for some of the elements of this assessment, such as pedestrian and cyclist amenity and driver delay. A greater demand for public transport could affect capacity and crowding on buses and rail services but it is expected that the frequencies of these services would increase with long-term demand.

12.11. Cumulative Effects

12.11.1 In line with The Planning Inspectorate in Advice Note Seventeen (Planning Inspectorate, 2019), the cumulative traffic and transport effects are inherently included in the future baseline scenarios as per the PTAR in Appendix 12.9.1 and the full list of cumulative development in Annex B. Development assumptions have been confirmed with Local Authorities. Strategic highway

modelling reported for PEIR includes background traffic growth based on the latest TEMPRO growth factors with adjustments to consider cumulative development. Future year networks have been updated in consultation with Highways England and Local Authorities to reflect the committed schemes for which funding has been secured. The estimates of rail and station crowding for PEIR also include for background traffic growth in line with Network Rail projections.

12.11.2 Modelling assumes growth at Heathrow with two runways from Heathrow's future baseline as published during its DCO consultation owing to the uncertainty around when Heathrow's third runway (R3) will come forward. If Heathrow R3 was to come forward, traffic levels at Gatwick would likely decline in the period immediately following the opening of R3. However, by 2047, there would be little difference between demand at Gatwick with or without Heathrow R3 and accordingly this scenario would be unchanged irrespective of developments at Heathrow.

12.11.3 The Heathrow R3 surface access narrative is predicated on "no more traffic", which is to say that total car traffic to the Airport is to be maintained at existing levels, albeit with variation in passenger and employee travel and therefore the distribution and timing of trips. Despite local variations, given the overall strategy of no more traffic at Heathrow, it is not envisaged that there would be a material impact on the performance of the highway network should both proposals come forward. In terms of public transport, the network and catchments serving the two airports are different and therefore the cumulative effects of Gatwick and Heathrow are unlikely to be significantly different to those described in this chapter. GAL will, however, keep this under review and as it progresses its work and prepares its final documents, including the formal Environmental Statement in support of development consent.

12.11.4 These assessments are considered to be comprehensive and within the defined assessment parameters at this stage for the purposes of PEIR based on the information available. Therefore, in keeping with the Planning Inspectorate Advice Note Seventeen, no additional cumulative assessment is considered to be required.

12.11.5 The assessment will be kept under review in the event that any new other existing development and/or approved development is identified that has potential to exceed the background growth assumptions and the model would be updated for the ES, as required.

12.12. Inter-Related Effects

12.12.1 The traffic and transport effects are not expected to have any inter-relationships with topics which have not already been considered.

12.12.2 There will be inter-related effects between forecast traffic flows and Air Quality (Chapter 13) and Noise and Vibration (Chapter 14). The highway improvement works that form part of the Project are also expected to have inter-related effects with Landscape and Visual Resources (Chapter 8). Effects on public rights of way are considered as part of Chapter 18: Agricultural Land Use and Recreation.

12.13. Summary

12.13.1 This chapter has set out the preliminary assessment of the environmental effects of the Project on severance, driver delay, pedestrian and cyclist delay and amenity, accidents and safety, hazardous loads, and public transport services and users. The assessment has been undertaken in accordance with IEMA (2004) and DMRB (Highways England *et al*., 2020) guidance and

professional judgement has been used for qualitative assessment where appropriate. This assessment for PEIR uses the best information available at the time of writing and it will be comprehensively updated for the final ES including outputs from strategic modelling. The final ES will accompany the application for development consent.

12.13.2 For the purposes of this assessment, the receptors are considered to be pedestrians, cyclists, bus and coach passengers, rail passengers, and car drivers and their passengers.

12.13.3 As part of the design development, embedded mitigation forms part of the Project, particularly with reference to the proposed highway improvements.

12.13.4 The assessment shows that given the existing high traffic flows on the highway network, the Project is not expected to generate substantial traffic flows beyond the local highways. However, owing to redistribution effects and modelling convergence, the strategic modelling work shows that there could be some increases in traffic flows in areas such as Croydon during certain times of day which are not as a result of the Project, particular during the interim assessment year 2032. This will be further investigated in the modelling work for the final development consent order.

12.13.5 Within the vicinity of the airport, there are segregated pedestrian and cycle routes which reduce the sensitivities of the highway links. The proposed highway improvements would also help reduce conflicts and risk of accidents.

12.13.6 Based on the methodology, assessment criteria and assignment of significance set out in this chapter, generally there are no significant effects which have been identified. However, it is recognised that a number of links will need further consideration in terms of increases in traffic flows and further mitigation may be required.

Table 12.13.1: Summary of Effects

Receptor	Receptor Sensitivity	Description of Impact	Short/medium/long term/permanent	Magnitude of Impact	Significance of Effect	Significant/not significant	Notes
Initial Construction Phase: 2024-2029							
Pedestrians and cyclists	Negligible to Medium	Severance	Medium term	Negligible	Negligible Adverse	Not Significant	
		Pedestrian and cycle delay	Medium term	Negligible	Negligible Adverse	Not Significant	
		Pedestrian and cycle amenity	Medium term	Low for A23 London Road, Negligible for all other roads	Minor Adverse for A23 London Road, Negligible Adverse for all other roads	Not Significant	
		Accident and Safety	Medium term	Low	Negligible Adverse	Not Significant	
Public transport users	Low	Public transport amenity	Medium term	Negligible	Negligible Adverse	Not Significant	
Car drivers and passengers	Low to Medium	Driver delay	Medium term	No Change to Medium	Moderate Adverse for two Croydon junctions, up to Minor Adverse for all other junctions.	Not Significant / Significant for two junctions	Further work and mitigation measures will be considered, and the residual effect is expected to reduce to not significant.

Receptor	Receptor Sensitivity	Description of Impact	Short/medium/long term/permanent	Magnitude of Impact	Significance of Effect	Significant/not significant	Notes
		Accidents and safety	Medium term	Low	Negligible Adverse	Not Significant	
		Hazardous loads	Medium term	Negligible	Negligible Adverse	Not Significant	
First Full Year of Opening: 2029							
Pedestrians and cyclists	Negligible to Medium	Severance	Medium term	Medium to High for Old Brighton Road South. Low for Perimeter Road East. Negligible for all other roads	Minor Adverse	Not Significant	
		Pedestrian and cycle delay	Medium term	Negligible	Negligible Adverse	Not Significant	
		Pedestrian and cycle amenity	Medium term	Medium for Old Brighton Road South. Negligible for all other roads	Minor Adverse for Old Brighton Road South, Negligible Adverse for all other roads.	Not Significant	
		Accident and Safety	Medium term	Negligible	Negligible Adverse	Not Significant	
Public transport users	Low	Public transport amenity	Medium term	Low	Minor Adverse	Not Significant	

Receptor	Receptor Sensitivity	Description of Impact	Short/medium/long term/permanent	Magnitude of Impact	Significance of Effect	Significant/not significant	Notes
Car drivers and passengers	Low to Medium	Driver delay	Medium term	No Change to Medium	Moderate Adverse for four junctions, up to Minor Adverse for all other junctions.	Not Significant / Significant for four junctions	Further work and mitigation measures will be considered, and the residual effect is expected to reduce to not significant.
		Accidents and safety	Medium term	Negligible	Negligible Adverse	Not Significant	
		Hazardous loads	Medium term	No Change	No Change	Not Significant	
Interim Assessment Year: 2032							
Pedestrians and cyclists	Negligible to Medium	Severance	Long term	Low to High	Moderate Adverse for three links in Croydon, up to Minor Adverse on all other roads. Minor beneficial for Perimeter Road North.	Not Significant / Significant for three links in Croydon.	Further work and mitigation measures will be considered, and the residual effect is expected to reduce to not significant.
		Pedestrian and cycle delay	Long term	Negligible to Low	Minor Adverse for Croydon links, Negligible to Minor	Not Significant	

Receptor	Receptor Sensitivity	Description of Impact	Short/medium/long term/permanent	Magnitude of Impact	Significance of Effect	Significant/not significant	Notes
					Beneficial for all other roads.		
		Pedestrian and cycle amenity	Long term	Negligible to Medium	Moderate Adverse for two Croydon links, Minor Adverse for all other roads.	Not Significant	Further work and mitigation measures will be considered, and the residual effect is expected to be not significant
		Accident and Safety	Long term	Negligible to Medium	Minor Beneficial where highway improvements are part of the Project, Negligible Adverse for all other roads.	Not Significant	
Public transport users	Low	Public transport amenity	Long term	Negligible to Low	Minor Adverse	Not Significant	
Car drivers and passengers	Negligible to Medium	Driver delay	Long term	No Change to Medium	Moderate Adverse for eight junctions, up to Minor Adverse for all other junctions.	Not Significant / Significant for eight junctions	Further work and mitigation measures will be considered, and the residual effect is expected to

Receptor	Receptor Sensitivity	Description of Impact	Short/medium/long term/permanent	Magnitude of Impact	Significance of Effect	Significant/not significant	Notes
							reduce to not significant.
		Accidents and safety	Long term	Low to Medium	Minor Beneficial at junctions where highway improvements are part of the Project, Negligible Adverse for all other roads	Not Significant	
		Hazardous loads	Long term	Negligible	Negligible Beneficial	Not Significant	
Design Year: 2047							
Pedestrians and cyclists	Negligible to Medium	Severance	Permanent	Low to High	Minor Adverse	Not Significant	
		Pedestrian and cycle delay	Permanent	Negligible to Low	Minor Beneficial where highway improvements are part of the Project, Negligible adverse for all other roads.	Not Significant	
		Pedestrian and cycle amenity	Permanent	Negligible to Low	Minor Beneficial where highway improvements are part of the Project,	Not Significant	

Receptor	Receptor Sensitivity	Description of Impact	Short/medium/long term/permanent	Magnitude of Impact	Significance of Effect	Significant/not significant	Notes
					Negligible Adverse for all other roads.		
		Accident and Safety	Permanent	Negligible to Low	Negligible to Minor Adverse / Beneficial	Not Significant	
Public transport users	Low	Public transport amenity	Permanent	Negligible to Low	Minor Adverse	Not Significant	
Car drivers and passengers	Low to Medium	Driver delay	Permanent	No Change to Medium	Moderate Adverse for 13 junctions, up to Minor Adverse for all other junctions.	Not Significant / Significant for 13 junctions	Further work and mitigation measures will be considered, and the residual effect is expected reduce to not significant.
		Accidents and safety	Permanent	Negligible to Low	Minor Beneficial at junctions where highway improvements are part of the Project, Negligible Adverse for all other roads	Not Significant	
		Hazardous loads	Permanent	Negligible	Negligible Beneficial	Not Significant	

Next Steps

12.13.7 The assessment undertaken for the PEIR is based on the best information available at this time. There will be further detailed work to produce the final ES chapter and Transport Assessment for the application for development consent. Ongoing consultation is also expected with highways authorities and other stakeholders on the Project and the expected transport impacts.

12.14. References

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12.15. Glossary

Table 12.15.1: Glossary of Terms

Term	Description
AADT	Annual Average Daily Traffic
ANPR	Automatic Number Plate Recognition
AQMA	Air Quality Management Area
ASAS	Airport Surface Access Strategy
CIF	Common interface file
CL	Citi Logik
CP5	Control Period 5
CP6	Control Period 6 (2019-2024)
CP7	Control Period 7 (2024-2029)
DfT	Department for Transport
DLR	Docklands Light Railway
DMRB	Design Manual for Roads and Bridges
EIA	Environmental Impact Assessment
ES	Environmental Statement
GAL	Gatwick Airport Limited
HGV	Heavy Goods Vehicle

Term	Description
IEMA	Institute of Environmental Management and Assessment
IP	Interpeak
LBG	London Bridge
LoS	Level of Service
LTP	Local Transport Plan
MCC	Manual Classified Counts
NCR	National Cycle Route
NDL	North Downs Line
NPPF	National Planning Policy Framework
NPPG	National Planning Practice Guidance
NPS	National Policy Statement
ORR	Office of Rail and Road
PEIR	Preliminary Environmental Information Report
PGC	Passenger Guidance Capacity
PINS	Planning Inspectorate
PR	Periodic Review
PTAR	Preliminary Transport Assessment Report
RIS	Road Investment Strategy
SERTM	South East Regional Transport Model
SRN	Strategic Road Network
TfL	Transport for London
tph	Trains per hour
V/C	Volume to Capacity
vehs	Vehicles
VIC	London Victoria

Preliminary Environmental Information Report
Chapter 13: Air Quality

September 2021

Table of Contents

13 Air Quality

13.1. Introduction

13.1.1 This chapter of the Preliminary Environmental Information Report (PEIR) presents the findings of the Environmental Impact Assessment (EIA) work undertaken to date concerning the potential effects of the proposal to make best use of Gatwick's existing runways (referred to within this report as 'the Project') on air quality and odour.

13.1.2 Air quality studies are concerned with the presence of airborne pollutants in the atmosphere. The main pollutants of concern for local air quality for this assessment are oxides of nitrogen (NOx), nitrogen dioxide (NO_2), particulate matter (PM_{10} and $PM_{2.5}$) and dust.

13.1.3 This PEIR chapter:

- sets out the existing and future environmental baseline conditions, established from desk studies, surveys and consultation to date;
- presents the potential environmental effects on air quality and odour arising from the Project, based on the information gathered and the analysis and assessments undertaken to date;
- identifies any assumptions and limitations encountered in compiling the environmental information; and
- highlights any necessary monitoring and/or mitigation measures that could prevent, minimise, reduce or offset the possible environmental effects identified in the EIA process.

13.1.4 This chapter is accompanied by the following appendices and figures:

- Chapter Figures 13.4.1, 13.6.1 and 13.9.1 to 13.9.12.
- Appendix 13.2.1: Local Planning Policy.
- Appendix 13.3.1: Summary of Stakeholder Scoping Responses.
- Appendix 13.4.1: Air Quality Assessment Method.
- Appendix 13.6.1: Air Quality Baseline Data and Model Verification.
- Appendix 13.6.2: Sensitive Receptors and Background Pollutant Concentrations.
- Appendix 13.8.1: Construction Phase Mitigation.
- Appendix 13.9.1: Air Quality Results Tables and Figures.
- Appendix Figures 1.1.1 to 1.1.4, 1.2.1 to 1.2.4, 2.1.1, 4.1.1 to 4.1.9 and 5.2.1 to 5.2.18.

13.1.5 The PEIR will inform pre-application consultation. Following consultation, comments on the PEIR will be reviewed and taken into account in preparation of the Environmental Statement (ES) that will accompany the application to the Planning Inspectorate for development consent.

13.2. Legislation and Policy

Legislation

European Air Quality Management Directives

13.2.1 In 1996, the European Commission published the Air Quality Framework Directive on ambient air quality assessment and management (96/62/EC). This Directive defined the policy framework for 12 air pollutants, including NO_2, known to have harmful effects on human health and the environment. Limit values (*pollutant concentrations not to be exceeded by a certain date*) for each

specified pollutant were set through a series of Daughter Directives: Directive 1999/30/EC for NO_2 and PM_{10} (amongst other pollutants), Directive 2000/69/EC for benzene and carbon monoxide, Directive 2002/3/EC for ozone, and Directive 2004/107/EC for certain toxic heavy metals and polycyclic aromatic hydrocarbons.

13.2.2 In May 2008, Directive 2008/50/EC on ambient air quality and cleaner air for Europe came into force. This Directive consolidated the above (apart from Directive 2004/107/EC), made provision for extended compliance deadlines for NO_2 and PM_{10} and introduced standards for $PM_{2.5}$.

13.2.3 The Directive has been transposed into national legislation in England by the Air Quality Standards Regulations 2010 (amended in 2016). In England, the Secretary of State for the Department of Environment, Food and Rural Affairs (Defra) has the duty of ensuring compliance with the air quality limit values.

National Emission Ceilings Directive

13.2.4 In December 2016, Directive 2016/2284/EU on the reduction of national emissions of certain atmospheric pollutants came into force (the National Emission Ceilings Directive). This Directive replaced previous versions, set emission ceilings for various pollutants and set emission reduction commitments for European member states (including for NOx and $PM_{2.5}$). The Directive has been transposed into national legislation in England by the National Emission Ceilings Regulations 2018.

Environment Act 1995

13.2.5 Part IV of the Environment Act 1995 places a duty on the Secretary of State for the Environment to develop, implement and maintain an air quality strategy with the aim of reducing atmospheric emissions and improving air quality. The air quality strategy (AQS) for England, Scotland, Wales and Northern Ireland (Defra *et al.*, 2007) provides the framework for ensuring compliance with air quality limit values based on a combination of international, national and local measures to reduce emissions and improve air quality. This includes the statutory duty, also under Part IV of the Environment Act 1995, for local authorities to undergo a process of local air quality management and declare Air Quality Management Areas (AQMA) where necessary.

Defra's Clean Air Strategy

13.2.6 Defra's Clean Air Strategy was published in January 2019 and aims to address the issue of air pollution, protect nature and boost the economy. The strategy sits alongside three others (Industrial, Clean Growth and 25 Year Environmental Plan). Actions in the document include reducing emissions from various sources, such as transport, domestic activities, farming and industry. There is also a long term target for reducing population exposure to $PM_{2.5}$ concentrations to meet the World Health Organisation's (WHO) target of 10µg/m^3 as an annual mean.

Draft Environment Bill

13.2.7 The draft Environment Bill (Defra, 2020a) is currently going through scrutiny in the United Kingdom (UK) Parliament and is at committee stage in the House of Lords. In January this year (2021) it was "*severely delayed*" for the third time from progressing through parliament and becoming part of UK law. The Bill is seen as an important step towards the UK tackling the environmental and climate crisis, addressing a range of environmental factors, including

improving air and water quality, protecting the wildlife, increasing recycling and reducing plastic waste. With regards to air quality, the Bill would set targets for pollutants of concern for human health such as "*a target in respect of the annual mean level of $PM_{2.5}$ in ambient air".* This $PM_{2.5}$ target may, but is not committed to being, a long term target and the Bill also does not commit to the WHO target of 10µg/m^3. The document does however provide local planning authorities with more powers to tackle air quality problems in their administrative areas.

Air Quality Standards

13.2.8 Some pollutants have standards expressed as annual average concentrations due to the chronic way in which they affect health or the natural environment (ie effects occur after a prolonged period of exposure to elevated concentrations) and others have standards expressed as 24-hour or 1-hour average concentrations due to the acute way in which they affect health or the natural environment (ie after a relatively short period of exposure). Some pollutants have standards expressed in terms of both long term and short term concentrations.

13.2.9 In this assessment, the term 'air quality standard' has been used to refer to both the UK objectives and European limit values. Table 13.2.1 sets out the air quality standards for the pollutants of most relevance to this assessment (NOx, NO_2, PM_{10} and $PM_{2.5}$). Other pollutants have been screened out of this air quality assessment, since they are not likely to cause exceedances of their respective standards. Should there be a need for other pollutants to be included in the assessment, these will be addressed in the ES.

Table 13.2.1: Air Quality Standards

Pollutant	Averaging Period	Air Quality Standard
Human Health		
Nitrogen dioxide (NO_2)	Annual mean	40 µg/m^3
	1-hour mean	200 µg/m^3, not to be exceeded more than 18 times a year (99.8th percentile)
Particulate matter (PM^{10})	Annual mean	40 µg/m^3
	24-hour mean	50 µg/m^3, not to be exceeded more than 35 times a year (90.4th percentile)
Fine particulate matter ($PM_{2.5}$)	Annual mean	25 µg/m^3
Natural Environment *		
Oxides of nitrogen (NOx)	Annual mean	30 µg/m^3

Source: Air Quality Standards Regulations 2010 (amended in 2016)

* The air quality standard for the natural environment is oxides of nitrogen, however further assessment is also undertaken in relation to nitrogen deposition. This is further described in Section 13.4 Assessment Methodology.

Planning Policy Context

13.2.10 The land-use planning process provides a key means of improving air quality, particularly in the long term, through the strategic location and design of new developments. Any air quality consideration that relates to land-use and its development can be a material planning consideration in the determination of planning applications, dependent upon the details of the proposed development.

Aviation Policy Framework and Strategy

13.2.11 The Aviation Policy Framework (APF) published in 2013 (Department for Transport, 2013) restated the Government's commitment to achieve full compliance with European air quality standards. It also stated that the policy in relation to air quality is to "*seek improved international standards to reduce emissions from aircraft and vehicles*". It further identifies road transport as the main source of pollution around airports, as ground level pollutant concentrations from aircraft emissions fall off significantly as aircraft climb to a higher altitude.

13.2.12 Following a call for evidence in July 2017, the Government published a new aviation strategy, Beyond the horizon: The future of UK aviation in April 2018 with the updated document (Aviation 2050: The future of UK aviation) (Department for Transport, 2018b) undergoing public consultation from December 2018 to June 2019. The document states that the government aims to *"achieve a safe, secure and sustainable aviation sector…provided that growth takes place in a sustainable way, with actions to mitigate the environmental impacts*". It will investigate whether the regulations, controls and incentives in place will tackle air quality concerns and *ensure that there is "a robust policy framework and package of measures to reduce the harmful effects of aviation on the environment, such as carbon emissions, air quality and noise*". As part of this wider aviation strategy, the Government also published a report on Making Best Use of existing runways in June 2018 (HM Government, 2018b). This policy was explicitly brought forward by Government in recognition of the value of providing early clarity on this important aspect of aviation policy.

National Policy Statements

13.2.13 The Airports National Policy Statement (Airports NPS) (Department for Transport, 2018a), although primarily provided in relation to a new runway at Heathrow Airport, remains a relevant consideration for other applications for airport infrastructure in London and the south east of England.

13.2.14 The NPS for National Networks (Department for Transport, 2014) sets out the need for development of road, rail and strategic rail freight interchange projects on the national networks and the policy against which decisions on major road and rail projects will be made[1]. This has been taken into account in relation to the highway improvements proposed as part of the Project.

13.2.15 Table 13.2.2 provides a summary of the relevant requirements of these NPSs and how they are addressed within the PEIR.

[1] It is noted that the Transport Decarbonisation Plan published by the Department for Transport (DfT) on 14th July 2021 announced DfT's intention to review the NPS for National Networks (NNNPS) in due course once demand patterns post-pandemic become clearer. It is understood DfT intend to commence the review by the end of 2021 and complete it by Spring 2023. In the interim and whilst the review is undertaken, DfT have confirmed the NNNPS remains relevant government policy and has full force and effect for the purposes of the Planning Act 2008.

Table 13.2.2: Summary of NPS Information Relevant to this Chapter

Summary of NPS requirement	How and Where They Are Considered in the PEIR
Airports NPS	
Paragraph 5.33 sets a requirement for the assessment to assess existing air quality levels for all relevant pollutants, forecasts of levels for all relevant pollutants at the time of opening and any likely significant effects of the scheme, their mitigation and any residual effects. Paragraphs 5.42 and 5.43 set out the considerations for decision-making with regards to air quality.	The PEIR includes an assessment of existing air quality levels for all relevant pollutants in the study area. Baseline information is provided in Section 13.6. The assessment forecasts levels for all relevant air quality pollutants at the time of opening, with and without the Project in operation (Section 13.9). The assessment determines the significance of effects from construction and operation of the Project (Section 13.9). The assessment includes consideration of all areas which are likely to be particularly relevant to the decision-making by the Secretary of State. A summary of effects has been provided in Section 13.13 with relevant mitigation measures for construction and operation presented in Section 13.8.
NPS for National Networks	
Paragraphs 5.6 and 5.7 set out a requirement for projects which require EIA or affect the UK's ability to comply with the Air Quality Directive to undertake an assessment of the impacts of the proposed project. This should include a forecast of air quality at the time of opening and any significant air quality effects, their mitigation and any residual effects.	The assessment predicts impacts of the Project at the time of opening and determines the likely significance of effects during both construction and operation (Section 13.9). Relevant mitigation measures for construction and operation are presented in Section 13.8.

National Planning Policy Framework

13.2.16 The National Planning Policy Framework (NPPF) (Ministry of Housing, Community and Local Government, 2021) sets out the planning policies for England. Paragraph 186 of the NPPF on air quality states that:

"Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan."

13.2.17 Sustainable growth in terms of travel is discussed in paragraph 105:

"The planning system should actively manage patterns of growth in support of these objectives. Significant development should be focused on locations which are or can be made sustainable, through limiting the need to travel and offering a genuine choice of transport modes. This can help to reduce congestion and emissions, and improve air quality and public health. However, opportunities to maximise sustainable transport solutions will vary between urban and rural areas, and this should be taken into account in both plan-making and decision-making."

13.2.18 Paragraph 174 of the framework states that "*Planning policies and decisions should contribute to and enhance the natural and local environment*" and in relation to air quality, this can be achieved by:

"e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans…".

13.2.19 The National Planning Practice Guidance (NPPG) supports the NPPF and provides guidance across a range of topic areas. In relation to air quality, the guidance refers to the significance of air quality assessments to determine the impacts of proposed developments in the area and describes the role of local and neighbourhood plans with regard to air quality (Ministry of Housing, Communities and Local Government, 2019).

Local Planning Policy

13.2.20 Gatwick Airport lies within the administrative area of Crawley Borough Council and adjacent to the boundaries of Mole Valley District Council to the north west, Reigate and Banstead Borough Council to the north east and Horsham District Council to the south west. The administrative area of Tandridge District Council is located approximately 1.9 km to the east of Gatwick Airport, while Mid Sussex District Council lies approximately 2 km to the south east. Gatwick Airport is located in the county of West Sussex and immediately adjacent to the bordering county of Surrey.

13.2.21 The relevant local planning policies applicable to air quality based on the extent of the study area for this assessment are summarised in Table 13.2.3 and explained further in Appendix 13.2.1. These have been considered throughout this air quality assessment.

Table 13.2.3: Local Planning Policy

Administrative Area	Plan	Policy
Adopted Policy		
Crawley	Crawley Borough Council Air Quality Action Plan 2018	Priority 3 Sustainability (Planning and Policy Guidance)
	Crawley 2030: Crawley Borough Local Plan 2015 - 2030	Policy ENV12 Air Quality
Horsham	Horsham District Planning Framework (excluding South Downs National Park) 2015	Strategic Policy 24 Environmental Protection
Mid Sussex	Mid Sussex District Plan 2014 – 2031	DP29: Noise, Air and Light Pollution
Mole Valley	Mole Valley Core Strategy (2007)	CS Policy 20: Reduced Flood Risk and Environmental Pollution
Reigate and Banstead	Reigate and Banstead Local Plan: Core Strategy 2014	Policy CS9: Gatwick Airport
		Policy CS10 Sustainable development
	Reigate and Banstead Local Plan Development Management Plan 2019	Policy DES8: Construction management
		Policy DES9: Pollution and contaminated land
Tandridge	Tandridge District Core Strategy 2008	Policy CSP 16 Aviation Development
	Tandridge Local Plan Part 2: Detailed Policies 2014 – 2029	DP22: Minimising Contamination, Hazards & Pollution
Surrey County Council	Surrey County Council Electric Vehicle Strategy 2018	Surrey Transport Plan: Electric Vehicle Strategy
	Surrey County Council Low Emissions Transport Strategy 2018	Surrey Transport Plan: Low Emissions Transport Strategy
Emerging Policy		
Crawley	Draft Crawley Borough Local Plan 2021-2037	Policy EP5: Air Quality
		Strategic Policy GAT1: Development of the Airport with a Single Runway
		Strategic Policy SD1: Presumption in Favour of Sustainable Development
	Consultation on Proposed Changes to Crawley's Air Quality Management Area (AQMA)	Proposed extension to Hazelwick AQMA
Horsham	Draft Horsham District Local Plan 2019-2036	Strategic Policy 1 – Sustainable Development

Administrative Area	Plan	Policy
		Policy 25 – Strategic Policy: Environmental Protection
		Policy 26 – Air Quality
Mole Valley	Future Mole Valley 2018 – 2033 Consultation Draft Local Plan	Policy EN13: Promoting Environmental Quality
		Policy EN14: Responding to the Climate Emergency
Tandridge	Tandridge District Council Our Local Plan: 2033 (Regulation 22 submission)	TLP46: Pollution and Air Quality

13.3. Consultation and Engagement

13.3.1 In September 2019, Gatwick Airport Limited (GAL) submitted a Scoping Report (GAL, 2019) to the Planning Inspectorate, which described the scope and methodology for the technical studies being undertaken to provide an assessment of any likely significant effects and, where necessary, to determine suitable mitigation measures for the construction and operational phases of the Project. It also described those topics or sub-topics proposed to be scoped out of the EIA process and provided justification as to why the Project would not have the potential to give rise to significant environmental effects in these areas.

13.3.2 Following consultation with the statutory bodies, the Planning Inspectorate (on behalf of the Secretary of State) provided a Scoping Opinion on 11 October 2019 (Planning Inspectorate, 2019).

13.3.3 Key issues raised by the Planning Inspectorate during the scoping process specific to air quality are listed in Table 13.3.1, together with details of how these issues have been addressed in the PEIR. Details of additional consultee responses are provided in Appendix 13.3.1.

Table 13.3.1: Summary of Scoping Responses

Details	How/Where Addressed in PEIR
On the basis of the uncertainty regarding the specification of any energy and heating plant and aircraft auxiliary power units (APUs), and the fact that SO_2 is considered as a "relevant combustion product" for aviation projects by the CAA, the Inspectorate considers that assessment of these pollutants cannot be scoped out at present. The Applicant should demonstrate that it is unlikely to give rise to significant air quality effects from these pollutants through the provision of a detailed screening assessment where relevant (particularly in respect of SO_2). The ES should include an assessment of the impacts associated with activities involving other pollutants, where they are likely to give rise to significant effects.	Additional pollutants to those included in the assessment (NOx, NO_2, PM_{10} and $PM_{2.5}$) have been screened out at this stage as they are very unlikely to result in an exceedance of air quality standards. Sulphur emissions from road vehicles are not a concern for local air quality due to stringent legislation on liquid fuels which has reduced SO_2 emissions from gas oil and diesel fuel. A more detailed justification or assessment of SO_2 emissions from

Details	How/Where Addressed in PEIR
	aircraft engines will be provided in the ES. No other pollutants have been identified that would be likely to give rise to significant air quality effects.
Paragraphs 7.4.17 and 7.4.18 in relation to geology and ground conditions explain that a desk-based Phase 1 Preliminary Risk Assessment will be undertaken to include an assessment of potential sources of contamination at the site (from historical and current land uses) both on site and in the surrounding area, and that this will be used to determine the requirement for any additional intrusive investigation at the site. At present there remains a degree of uncertainty regarding the potential for odorous contaminated material to be disturbed by the Proposed Development. Accordingly, the Inspectorate is not in a position to agree to scope these matters from the assessment. The ES should (with reference to the phase 1 ground investigation studies) assess impacts from odorous material during construction where significant effects are likely to occur. The assessment of odorous materials should cross refer to other relevant aspects and matters in the ES to ensure that a robust assessment has been undertaken.	From the Project Description and expected works, no odorous materials are expected to be excavated during construction of the Project therefore this has not been assessed in the PEIR. This will be further verified in the ES following any updates from the contaminated land assessment.
The Inspectorate agrees that the jettisoning of fuel from aircraft can be scoped out of the air quality assessment on the basis that: ▪ It is an infrequent occurrence, only used in emergency situations; and ▪ If required, it would be at a high altitude (to vaporise the fuel and facilitate dispersion). The Inspectorate agrees that there is no potential for significant air quality effects from this activity. The Inspectorate also assumes that operational safety procedures are in place for such situations in connection with the existing operations at Gatwick.	No action needed.
The Scoping Report refers to the Institute of Air Quality Management (IAQM) guidance 'Assessment of dust from demolition and construction', and states that monitoring during construction will be included as part of the CoCP (if required). The need for monitoring during construction should be considered in accordance with the IAQM 'Air Quality Monitoring in the Vicinity of Demolition and Construction Sites'. In particular, the CoCP described at paragraphs 5.3.9 – 5.3.11 should be clear as to how the need for monitoring has been determined, how the construction air quality assessment relies on delivery of such monitoring.	A monitoring strategy will be agreed with the local planning authority and implemented through the Code of Construction Practice (CoCP). An outline CoCP is provided at Appendix 5.3.1. Further details in terms of air quality are also provided at Appendix 13.4.1. Riverside Garden Park has been assessed as a receptor in the construction dust

Details	How/Where Addressed in PEIR
Specific consideration of construction dust effects to the adjacent Riverside Garden Park will also need to be presented as part of the assessment (having regard to its proximity to the proposed North and South terminal junction works).	assessment in this PEIR assessment.
The Applicant acknowledges that SO_2 may contribute to acid and nutrient nitrogen deposition at natural ecosystems, but Table 7.7.3 only refers to "harm to ecological receptors due to increased NOx concentrations and nitrogen deposition". The Inspectorate considers that the assessment of air quality impacts on ecological receptors should be extended to consider SO_2.	Sulphur emissions from road vehicles, aircraft engines and other airport sources would not significantly affect the acidity at the ecological sites in this assessment, therefore acidity from sulphur has not been assessed. Sulphur emissions from road vehicles are not a concern for local air quality due to stringent legislation on liquid fuels which has reduced SO_2 emissions from gas oil and diesel fuel. Acidity from nitrogen has been taken into account in the assessment of the ecological sites reported in the Habitats Regulations Assessment (HRA).
Air Quality Management Areas (AQMAs) are presented in the Scoping Report with reference to the existing baseline conditions, but they are not specifically referenced further in terms of the proposed scope of the assessment. The Applicant sets out that the assessment of air quality effects will be informed by relevant transport modelling and this should be used to define an appropriate study area for the assessment of effects. Any impacts to AQMAs identified within the transport models should be assessed. For example, the A23 Horley AQMA may experience impacts given that a large proportion of the airport's passenger traffic comes from London and is likely to access the airport via the A23/M23 alongside relevant AQMAs on the M25. The impacts on the Hazelwick Roundabout AQMA should also be specifically considered during construction and operation given the works associated with the North and South Terminal junctions and the increased airport passenger and employee trip generation that is likely to affect this AQMA in particular.	Predicted modelled concentrations at receptors in the Horley and Hazelwick AQMAs are reported in this chapter (Section 13.9) for construction and operation and will also be reported in the ES. Air quality impacts at other AQMAs in the wider study area were assessed with the full list of modelled receptors and predicted concentrations in Appendix 13.9.1.
The Inspectorate notes that there are five continuous monitoring sites within 1 km of Gatwick Airport and a "wide network of diffusion tubes" from which to consider baseline data.	A Project-specific air quality survey was undertaken between 2016 and 2020 at key areas of concern around the airport. The PEIR contains full

Details	How/Where Addressed in PEIR
The Scoping Report explains that an air quality diffusion tube survey along the A23 Brighton Road and in the vicinity of the Hazelwick roundabout is ongoing. There are no other references to the need for additional project-specific monitoring to inform the determination of baseline conditions. The ES should clearly set out all studies and surveys undertaken to inform the final baseline information, including the timing of any site visits and how/if professional judgement has been applied.	details of relevant monitoring carried out for the Project, including sites along the A23 and near to Hazelwick Roundabout. The results were used to inform the baseline conditions reported in the PEIR. Relevant information is presented in Section 13.6 and in Appendix 13.6.1.
The ES should clearly set out assumptions made around predictions of future background pollutant concentrations, including details as to how the predicted growth of passenger throughput in the absence of the Proposed Development ("scenario 1" as presented in Chapter 3 of the Scoping Report) influences the future baseline.	The PEIR contains details of how future background concentrations have been assessed and how predicted growth has influenced the future baseline.
The Applicant proposes to predict pollutant concentrations across a gridded area "likely to be 11 km by 10 km centred on the airport", (subject to amendment if required to ensure all significant effects are captured), and including discrete sensitive human and ecological receptors which may be beyond the contour grid area. This process should be clearly set out in the ES, including reasons why discrete receptors outside of any defined contour grid area need not warrant an extension to that grid area. The ES should have regard to the Air Navigation Guidance 2017 with respect to the parameters for assessment of aviation emissions on local air quality. The Inspectorate agrees that the study area is not appropriately defined by an 'arbitrary limit' and instead should be defined by the area over which significant air quality effects could arise.	The study area for the assessment has been defined by screening the changes in traffic flows due to the Project within the Traffic Reliability Area (TRA)[2] in addition to the roads assessed within a 11 km by 10 km domain centred on the airport (Figure 13.4.1). Therefore, discrete receptors (human and ecological) outside of the 11 km by 10 km domain have been assessed. Further methodology details of the roads and receptors included in the assessment are described in Section 13.4.6 with all receptors presented in Appendix 13.6.2.
The ES should explain how modelled outputs across gridded areas (or at modelled receptors) will be considered together such that combined concentrations associated with road traffic and aircraft emissions can be predicted (where applicable).	The PEIR has included model outputs at discrete sensitive receptors within both the 11 km by 10 km domain and wider study area outside of this domain. The approach for the PEIR is detailed in Appendix 13.4.1. The ES will further include gridded model outputs for the 11 km by 10 km domain.

[2] The traffic reliability area is defined as the area in which the traffic model has been calibrated and validated to with the use of observed data.

Details	How/Where Addressed in PEIR
Be aware of the recommendations of the Government's air quality expert group publication 'Ultrafine Particles (UFP) in the UK' report, and the Government's draft aviation 2050 strategy around UFP and take into account emerging policy and legislative change in this regard.	The ES will consider emerging policy and legislation (where appropriate) at the time of writing. There are no specific emission factors to allow quantitative assessment of ultrafine particles at present, but they are included within the $PM_{2.5}$ size fraction which will be assessed in the ES and are taken into account in the PEIR (both in the chapter and appendix).
The sensitive receptors in the ES should include airport passengers, users of associated facilities (eg hotels and offices) and employees where relevant.	Sensitive receptors are defined as per Environmental Protection UK (EPUK)/IAQM guidance (Moorcroft and Barrowcliffe. *et al.*, 2017) and Defra Technical Guidance (TG16) (Defra, 2021b) and represent best practice for an air quality assessment. Further details are provided in this chapter (13.4.10 to 13.4.22) with all modelled sensitive receptors presented in Appendix 13.6.2.
As part of the detailed emissions inventory, the ES should present the anticipated level of aircraft emissions having regard to air traffic projections at each of the assessment scenario intervals. Any assumptions made in respect to fleet composition, engine standards, and growth rates (or ranges) should be explained and justified. The Applicant explains that the modelling "can allow for variations of each of the emission sources with time", and the ES should explain how these variations could affect the assessment of significant effects though sensitivity analysis or otherwise. These assumptions should also be framed in the context of the "key parameters" as set out in table 5.4.1 (in particular around additional passenger air transport movements).	Full details of the emissions inventory will be provided in the ES. Details on the methodology and assumptions for the emissions inventory for this PEIR assessment are presented in Appendix 13.4.1. The assessment has been based on the best estimate of emissions and worst case assumptions where applicable.
The potential need for, specification and location of water treatment works is not yet defined (as set out in paragraphs 5.2.58 – 5.2.60). The air quality assessment should address the potential impacts of any proposed treatment works on nearby sensitive receptors in accordance with the IAQM odour guidance, and consider the need for mitigation measures where appropriate. In accordance with that guidance, the ES should set out how a multi-tool approach has been applied to determine the need for impact screening, sampling and dispersion modelling in order to assess effects at relevant sensitive receptors.	It is proposed that three new pumping stations are provided that will connect to existing infrastructure (further described in Chapter 5 Project Description). Therefore, no detailed odour assessment is required for the construction of the Project.

Details	How/Where Addressed in PEIR
The ES should clearly set out the criteria against which the need for operational mitigation measures will be determined, and the suite of measures that have been considered. In doing so, the Applicant should demonstrate regard given to the Sussex Air Partnership's Air Quality and Emissions Mitigation Guidance for Sussex (2021) in assessing air quality impacts and deriving necessary mitigation measures as well as the Defra 'Air quality damage cost guidance'.	The PEIR has and the ES will detail the criteria that determine the need for mitigation. Full details of the construction mitigation measures proposed are provided in Appendix 13.8.1. The Sussex guidance has been considered in this assessment with the outcome and mitigation proposed stated in Section 13.9 of this chapter.

13.3.4 Key issues raised during consultation and engagement with interested parties specific to air quality are listed in Table 13.3.2, together with details of how these issues have been addressed in the PEIR.

Table 13.3.2: Summary of Consultation

Consultee	Date	Details	How/Where Addressed in PEIR
Local Planning Authority Air Quality, Carbon and Climate Change Topic Working Group: Local Planning Authorities (Crawley Borough Council, Reigate and Banstead Borough Council, Mole Valley District Council, West Sussex County Council, Surrey County Council, Horsham District Council, Mid Sussex District Council, East Sussex County Council and Kent County Council)	28.08.19	Discussion on topics such as: ▪ modelling of certain sensitive receptors such as Ashdown Forest; ▪ scenario years; ▪ strategic traffic model being used for the ES; ▪ study area extent; ▪ odour assessment; ▪ source apportionment; and ▪ height of modelling aircraft emissions.	No changes to scope identified.
Wider stakeholders and Local Planning Authorities Technical Officer Group (Brighton and Hove City Council, Wealden District Council, Sevenoaks District Council, Waverley District Council, London Borough of Croydon, London Borough of Sutton, Royal Borough of Windsor and Maidenhead, Greater London Authority, Transport for London, Highways England, Historic England, Network Rail,	03.09.19	Presentations on: ▪ scope of assessment and methodology; ▪ scenarios years; ▪ study area extent; and ▪ sensitive receptors.	No changes to scope identified.

Consultee	Date	Details	How/Where Addressed in PEIR
Charlwood Parish Council, Horley Town Council, Coast to Capital LEP)			
Local Planning Authority Air Quality, Carbon and Climate Change Topic Working Group: Local Planning Authorities (Crawley Borough Council, Reigate and Banstead Borough Council, Mole Valley District Council, West Sussex County Council, Surrey County Council, Horsham District Council, Mid Sussex District Council	27.01.20	Project update including: ▪ air traffic forecasts; ▪ proposed developments; ▪ construction; and ▪ DCO timeline. Presentations on Emerging findings of preliminary impact assessment work: ▪ Air Quality; ▪ Carbon and Climate Change; and ▪ Major Accidents and Disasters.	No changes to scope identified
Crawley Borough Council and Reigate & Banstead Borough Council	25.03.21	Request for records of odour complaints in the local planning authority area for the past 5 years.	Qualitative assessment of odour complaints in Section 13.6.
Multiple local planning authorities within the study area	January to June 2021	Requests for latest year of monitoring data in the local planning authority area.	Inclusion in baseline desk study.

13.4. Assessment Methodology

Relevant Guidance

13.4.1 The following guidance documents relevant to air quality have been considered in the assessment process:

- Local Air Quality Management Technical Guidance (TG16) (Defra, 2021b).
- Guidance on the assessment of dust from demolition and construction (Holman *et al.*, 2014).
- Guidance on Monitoring in the Vicinity of Demolition and Construction Sites (Institute of Air Quality Management, 2018).
- Guidance on the assessment of odour for planning (Bull *et al.*, 2018).
- Land-Use Planning and Development Control: Planning for Air Quality (Moorcroft and Barrowcliffe. *et al.*, 2017).
- A guide to the assessment of air quality impacts on designated nature conservation sites (Holman *et al.*, 2020).
- Airport Air Quality Manual (International Civil Aviation Organization (ICAO), 2020).
- Project for the Sustainable Development of Heathrow (Department for Transport, 2006).

- Natural England's approach to advising competent authorities on the assessment of road traffic emissions under the Habitats Regulations (Natural England, 2018).
- Air quality and emissions mitigation guidance for Sussex (Sussex-Air, 202).

Scope of the Assessment

13.4.2 The scope of this PEIR has been developed in consultation with relevant statutory and non-statutory consultees as detailed in Table 13.3.1 and Table 13.3.2.

13.4.3 Taking into account the scoping and consultation process, Table 13.4.1 summarises the issues considered as part of this assessment.

Table 13.4.1: Issues Considered in the Assessment

Activity	Potential Effects
Construction Phase (including Demolition): Air Quality	
Construction and demolition activities, including upgraded highway junctions, earthworks, land preparation, construction sites and airside development	Dust generation causing annoyance due to dust soiling, human health impacts due to increased PM_{10} concentrations and harm to ecological receptors.
	Emissions from construction vehicles and non-road mobile machinery causing human health impacts due to increased NOx, PM_{10} and $PM_{2.5}$ concentrations.
Construction vehicle movements using the public highway network	Emissions from construction road traffic causing human health impacts due to increased NOx, PM_{10} and $PM_{2.5}$ concentrations, and harm to ecological receptors due to increased NOx concentrations.
Operational Phase: Air Quality	
Use of Airport including aircraft, road traffic and aircraft plant (and including upgraded highway junctions)	Emissions from road traffic causing human health impacts due to increased NOx, PM_{10} and $PM_{2.5}$ concentrations, and harm to ecological receptors due to increased NOx concentrations, nitrogen and acid deposition.
	Aircraft emissions causing human health impacts due to increased NOx, PM_{10} and $PM_{2.5}$ concentrations, and harm to ecological receptors due to increased NOx concentrations and nitrogen deposition.
	Emissions from airport operations/combustion plant causing human health impacts due to increased NOx, PM_{10} and $PM_{2.5}$ concentrations, and harm to ecological receptors due to increased NOx concentrations and nitrogen deposition.
	Increased emissions of odours from operations (eg aircraft fuel, other airport operations/plant) causing annoyance.

13.4.4 Effects which are not considered likely to be significant have been scoped out of the assessment. A summary of the effects scoped out are presented in Table 13.4.2.

Table 13.4.2: Effects Scoped Out of the Assessment

Effect	Justification
Pollutants that are listed in the Air Quality Standards Regulations 2010 (amended in 2016) other than NOx, NO_2, PM_{10} and $PM_{2.5}$ have been scoped out of the air quality assessment.	The Defra TG16 document notes that the only relevant pollutants for road traffic and airports are NO_2 and particulate matter (Defra, 2021b). Emissions of other regulated pollutants are very unlikely to be significant and concentrations of these pollutants have not been identified in the local planning authority review and assessments as likely to exceed their respective air quality standards.
Assessment of odour emissions during construction.	It is not anticipated that any odorous materials will be excavated or used during the construction phase therefore this has not been assessed in the PEIR. This will be verified in the ES following any updates of the contaminated land assessment. Any emissions of odorous materials would be controlled through the CoCP, such that they would not have a significant effect on amenity.
Impacts from jettisoning of fuel from aircraft.	The jettisoning of fuel from aircraft is only undertaken in emergency situations when an aircraft is required to undertake an emergency landing and jettisoning of fuel will usually occur over water and at high altitude in order to vaporise the fuel and facilitate dispersion. These events are very infrequent, and it is not considered that there would be any potential significant effects from this activity. This approach has been agreed through the scoping process (Table 13.3.1).

Study Area

13.4.5 The study area for the assessment of construction dust emissions is 350 metres from any dust generating activity (50 metres for ecological effects) and up to 500 metres along construction traffic routes from the site entrance(s), as defined in the IAQM guidance (Holman et al., 2014). The guidance states that at greater distances *"the level of risk is "negligible", and any effects will be not significant".*

13.4.6 The study area for the assessment of operational emissions has been defined by the screening of changes in traffic data due to the Project within the TRA in addition to a 11 km by 10 km domain centred on the airport (Figure 13.4.1). The Affected Road Network (ARN) comprised of traffic links that exceeded the EPUK/IAQM guidance screening criteria (Moorcroft and Barrowcliffe. *et al*., 2017). Sensitive receptors were assessed when within 200 metres of the ARN. Additional roads within 200 metres of the sensitive receptors were also added in the assessment to ensure all relevant emissions were accounted for. Aircraft emissions have been assessed for the landing and take-off (LTO) cycle up to 3,000 ft (approximately 915 metres) in height as defined by the ICAO.

13.4.7 In this assessment the term 'wider study area' has been used to refer to the 11 km by 10 km domain plus the modelled roads (that exceeded the EPUK/IAQM guidance screening criteria) outside the domain for each assessment scenario.

13.4.8 Traffic data from the Simulation and Assignment of Traffic to Urban Road Networks (SATURN) transport model were used to calculate construction and operational traffic emissions for the Project. All roads have been modelled within the 11 km by 10 km domain. Outside this domain, as stated in Section 13.4.6, changes in traffic flows have been screened for the need of detailed assessment. The study area is therefore different for each assessment scenario depending on the screening.

13.4.9 Pollutant concentrations have been predicted at discrete sensitive human and ecological receptors within the 11 km by 10 km domain and along the modelled roads outside this domain.

Identification of Sensitive Receptors

13.4.10 Sensitive receptors are defined as those locations where members of the public might be regularly exposed, such as residential properties, schools, hospitals and care homes. AddressBase Plus data (Ordnance Survey, 2019) were obtained from Ordnance Survey (OS) to identify sensitive receptors within the 10 km by 11 km domain. This is a geospatial dataset that includes local authority and Royal Mail addresses, multi-occupancy addresses, objects without postal addresses and OS MasterMap Topography Layer and Integrated Transport Network references. Within the wider study area, receptors were also selected using satellite imagery and databases of school, care home and National Health Service (NHS) trust site location information (UK Government, 2021) (NHS England, 2021).

13.4.11 Pollutant concentrations have been predicted at the discrete sensitive human receptors within the 11 km by 10 km domain for all assessment scenarios. A total of 716 representative sensitive human receptors were selected for inclusion within the grid domain (63 schools/nurseries, 74 hospitals/care homes, 487 residential dwellings, two community centres close to modelled pollution sources in the study area and 90 committed developments).

13.4.12 Pollutant concentrations have been predicted at discrete sensitive human receptors along the road network in addition to those within the 11 km by 10 km domain for each of the assessment scenarios. For the 2024 construction phase for airfield works scenario an additional 345 sensitive human receptors were included in the assessment. For the 2029 construction phase for surface access improvements scenario an additional 397 sensitive human receptors were included. For the 2029 and 2032 operational scenarios an additional 318 and 742 sensitive human receptors were included respectively. The number of receptors included for each assessment scenario varies depending on the extent of the screened in roads in the wider study area.

13.4.13 The sensitive receptors included in the model have been selected as representative of worst case (most sensitive) locations along modelled roads, junctions, or airport sources.

13.4.14 Sensitive ecological receptors are defined as those sites whose features have been designated as sensitive to air pollutants, either directly or indirectly. This includes statutory designations such as Sites of Special Scientific Interest (SSSI), Special Protection Areas (SPAs), Special Areas of Conservation (SACs), National Nature Reserves (NNR), Local Nature Reserves (LNRs) as well as non-statutory designations such as ancient woodlands. The air quality assessment has included both statutory and non-statutory sites in the wider study area.

13.4.15 Vegetation can be adversely affected in the presence of sufficient levels of NOx. Deposition of pollutants derived from NOx emissions contribute to acidification and/or eutrophication of sensitive habitats leading to loss of biodiversity or changes to species composition. The likelihood

of such effects occurring is determined by pollutant thresholds known as 'critical loads' which are defined by the United Nations Economic Commission for Europe (UNECE, 2015) as:

"a quantitative estimate of exposure to one or more pollutants below which significant harmful effects on specified sensitive elements of the environment do not occur according to present knowledge."

13.4.16 It is important to distinguish between the critical load and the air quality standard (or critical level) for NOx, as defined in Section 13.2. The critical load relates to the quantity of pollutant (in this case nitrogen) deposited from air to the ground, whereas the critical level (air quality standard) is the gaseous concentration of a pollutant in the air. Critical loads specific to a particular ecological receptor site or particular habitats within them are provided by the Air Pollution Information System (APIS) (Centre for Ecology and Hydrology, 2021).

13.4.17 Further details and the locations of human and ecological sensitive receptors are presented in Appendix 13.6.2.

Methodology for Baseline Studies

13.4.18 This section outlines the methodology for determining the current baseline environment.

Desk Study

13.4.19 Existing or baseline ambient air quality refers to the concentrations of relevant substances that are already present in the environment. These are present from various sources, such as industrial processes, commercial and domestic activities, traffic and natural sources.

13.4.20 A desk-based review was undertaken using the following data sources to determine baseline conditions for air quality in this assessment:

- the UK Air Information Resource website (Defra, 2021c);
- data from monitoring surveys carried out for the Project and by the local planning authorities (Appendix 13.6.1);
- the Pollution Inventory website (Environment Agency (EA), 2021);
- Geographical Information Systems (GIS) boundaries of designated ecological sites (Natural England, 2021);
- background UK emissions data (National Atmospheric Emissions Inventory (NAEI), 2021); and
- the APIS website (Centre for Ecology and Hydrology, 2021).

Site-Specific Surveys

13.4.21 A monitoring survey has been undertaken by Arup to supplement the monitoring surveys carried out by Reigate and Banstead Borough Council and Crawley Borough Council. The survey was undertaken between June 2016 and March 2020. A passive monitoring method was used for measuring ambient concentrations of NO_2 with diffusion tubes. Measurements were taken on a monthly basis at key areas of concern around the airport. Further information on the measurements and the site locations are provided in Appendix 13.6.1.

Assessment Criteria and Assignment of Significance

13.4.22 The overall approach to the air quality assessment comprises:

- a review of the existing and future local air quality conditions at and around the airport;
- an assessment of the potential changes in air quality arising from the construction activities of the Project;
- an assessment of the potential changes in air quality arising from the operation of the Project; and
- the formulation of any additional mitigation measures, where necessary, to ensure any potential adverse effects on air quality are minimised.

13.4.23 Emissions of NOx, PM_{10} and $PM_{2.5}$ have been calculated using methods described in the following sections for each pollution source. The following sections also detail the method for calculating pollutant concentrations and nitrogen deposition. Full details of the methodology, including relevant assumptions and limitations can be found in Appendix 13.4.1.

Assessment Scenarios

13.4.24 The following assessment years and scenarios have been included in the air quality assessment:

- 2018 current baseline;
- 2024-2029 construction phase for airfield works;
- 2029 future baseline without the Project;
- 2029 first full year of the Project opening;
- 2029-2032 construction phase for surface access improvements;
- 2032 future baseline without the Project;
- 2032 interim assessment year of the Project;
- 2038 design year without the Project; and
- 2038 design year of the Project.

13.4.25 Chapter 12: Traffic & Transport also includes an assessment for 2047. However, air quality is expected to improve in the future and current tools include predictions only up to 2030. Any predictions for 2047 would be highly uncertain. Air quality in 2047 is expected to be significantly better than current conditions therefore this has not been included in the assessment.

13.4.26 The 2018 current baseline scenario provides information on the existing air quality conditions in the study area and provides the basis for verifying the air quality model outputs against local measurements. The year 2018 was selected for the latest available transport information, (2018 was selected due to the availability of baseline information and the impact of Covid-19 on traffic flows, more detail on this is provided in Chapter 12: Traffic and Transport).

13.4.27 The 2024-2029 construction scenario for the airfield works has assumed the peak construction traffic flows applied to the first year of construction (2024) as a worst case. In reality, the peak year of construction is closer to the end of the construction period. However, using 2024 emissions and backgrounds will provide a worst case assessment in terms of air quality impacts since emissions and background concentrations are anticipated to improve in future years. This scenario has focussed on the effects of road traffic emissions and the airport contribution has been assumed to be the same as in the 2029 assessment year scenario.

13.4.28 The 2029 assessment year represents the first full year of the Project opening. The 2032 assessment year represents an interim assessment following completion of the surface access improvements and the majority of the airfield works. For the 2032 scenario, 2030 background pollutant concentrations and road vehicle emissions have been used as the latest available data from Defra (no 2032 data are available) (Defra, 2021c).

13.4.29 The 2029-2032 construction scenario for the surface access improvements has assumed the peak construction traffic flows applied to the first year of this phase (2029) as a worst case since emissions and background concentrations are anticipated to improve in future years. During this construction period there will be an overlap with the operation of the Project. This scenario has focussed on the effects of road traffic emissions and the airport contribution has been assumed to be the same as in the 2029 (first full year of the Project opening) assessment year scenario.

13.4.30 The design year of the Project is 2038. It is anticipated that there will be improvements in background air quality and vehicle emissions in the future and current tools include predictions only up to 2030, therefore the 2032 assessment year represents the worst case for air quality. The 2038 design year has been assessed for the PEIR only in terms of aircraft emissions and not for road vehicle emissions. As only aircraft emissions were calculated for 2038 no pollutant concentrations were predicted for this scenario. Emissions and backgrounds are expected to reduce in the future and therefore 2032 is likely a worst case scenario for the air quality assessment.

Construction Assessment Methodology

Construction Dust Assessment

13.4.31 The effects from demolition and construction of the Project have been assessed using the qualitative approach described in the latest guidance by the IAQM (Holman *et al.*, 2014). The construction dust assessment has been carried out following a conservative approach, assuming all construction activities take place in the same time period.

13.4.32 An ‘impact’ is described as a change in pollutant concentrations or dust deposition, while an ‘effect’ is described as the consequence of an impact. The main impacts that may arise during demolition and construction of the Project are:

- dust deposition, resulting in the soiling of surfaces;
- visible dust plumes;
- elevated PM_{10} concentrations as a result of dust generating activities on-site; and
- an increase in NO_2 and PM_{10} concentrations due to exhaust emissions from non-road mobile machinery and vehicles accessing the site of the Project.

13.4.33 The IAQM guidance considers the potential for dust emissions from activities such as demolition of existing structures, earthworks, construction of new structures and trackout (Holman *et al.*, 2014). Earthworks refer to the processes of soil stripping, ground levelling, excavation and land capping, while trackout is the transport of dust and dirt from the site onto the public road network where it may be deposited and then re-suspended by vehicles using the network. This arises when vehicles leave the site with dusty materials, which may then spill onto the road, or when they travel over muddy ground on-site and then transfer dust and dirt onto the road network.

13.4.34 For each of these dust-generating activities, the guidance considers three separate effects:

- annoyance due to dust soiling;
- harm to ecological receptors; and
- the risk of health effects due to a significant increase in PM_{10} exposure.

13.4.35 The assessment of construction dust has been undertaken using a five step process. Following the screening for the need of the assessment (step 1) this involves the identification of the magnitude of dust emission and sensitivity of the surrounding area (step 2); the determination of the site-specific mitigation (step 3); identification of any significant effects (step 4); and finally, the reporting of the assessment (step 5). The full methodology for the assessment of construction dust emissions, including tables to describe the sensitivity and magnitude, is detailed in Appendix 13.4.1.

Construction Traffic Assessment

13.4.36 Changes to air pollutant concentrations as a result of additional construction vehicles on the highway network have been predicted using the Atmospheric Dispersion Modelling System (ADMS) ADMS-Airport (version 5.0.0.1).

13.4.37 The two construction assessment scenarios are as presented in paragraphs 13.4.27 and 13.4.28 in this section. The peak construction traffic data for each of the scenarios have been used for the assessment, including changes in traffic patterns in the area. The peak in construction activity is close to 2029 and therefore both construction traffic scenarios use 2029 aircraft-related and car park emissions for the with and without Project scenarios.

13.4.38 Full details of the modelling methodology and calculations of emissions, and any assumptions and limitations are provided in Appendix 13.4.1 with the assessment of significance as per paragraph 13.4.47.

Operational Assessment Methodology

13.4.39 A review of sources and emissions associated with the existing baseline conditions and the operation of the Project have been carried out. Data have been gathered for the following pollution sources for the compilation of an emission inventory:

- aircraft main engines in the LTO phase both at ground level and at height;
- aircraft auxiliary power units (APUs);
- ground support equipment (GSE), namely vehicles operating airside which are associated with aircraft turn-around and runway maintenance;
- other airport sources, such as heating plant, fire training ground, aircraft engine testing and brake & tyre wear;
- road vehicles on the local highway network (split into airport and non-airport related emissions); and
- vehicles at car parks.

13.4.40 The ADMS-Airport dispersion model has been used for the assessment of operational emissions to predict annual mean concentrations for the pollutants of concern at sensitive human and ecological receptors. The performance of the air quality model has been verified against local air quality monitoring data. The methodology for the assessment of impacts and significance of effects at sensitive human and ecological receptors is outlined in the paragraphs below.

13.4.41 Full details of the modelling methodology and calculations of emissions, and any assumptions and limitations are provided in Appendix 13.4.1 with the assessment of significance as per paragraph 13.4.465 and 13.4.476.

Human Receptors

13.4.42 For the assessment of impacts and significance of effects at sensitive human receptors (including residents living at committed developments), the approach described in the EPUK/IAQM guidance has been used (Moorcroft and Barrowcliffe. *et al.*, 2017). This is best practice for undertaking air quality assessments in the UK and has been used for the assessment of other major airport developments.

Receptor Sensitivity/Value

13.4.43 All assessed human receptors have been classified as high sensitivity for the construction and operational assessments.

Magnitude of Impact

13.4.44 The magnitude of impact at each of the receptors has been calculated by taking into account the percentage change in predicted concentrations as a result of the Project and the predicted concentrations relative to the air quality standard.

13.4.45 In accordance with the EPUK/IAQM guidance (Moorcroft and Barrowcliffe. *et al.*, 2017) the impact descriptors used in this assessment (for both construction and operation) are set out in Table 13.4.3. Where the Project is predicted to considerably increase concentrations of pollutants then an adverse impact would be anticipated and where the Project is predicted to considerably decrease concentrations a beneficial impact would be anticipated.

Table 13.4.3: Assessment Matrix

Long term average Concentration at receptor in assessment year	% Change in concentration relative to Air Quality Assessment Level (AQAL)			
	1	2-5	6-10	>10
75% or less of AQAL	Negligible	Negligible	Slight	Moderate
76-94% of AQAL	Negligible	Slight	Moderate	Moderate
95-102% of AQAL	Slight	Moderate	Moderate	Substantial
103-109% of AQAL	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Moderate	Substantial	Substantial	Substantial

Significance of Effect

13.4.46 The following considerations have been made during the evaluation of significance for air quality:

- the predicted change in pollutant concentration as a result of the Project;
- the level of predicted pollutant concentration as a result of the Project in relation to the air quality standards;
- the existing and future air quality in the absence of the Project;
- the extent of current and future population exposure to the impacts; and
- the influence and validity of any assumptions adopted when undertaking the prediction of impacts.

13.4.47 These factors have been taken into account to determine whether effects are likely to be significant. For this assessment, moderate and substantial impacts have been considered to result in a significant effect, while negligible and slight impacts have been considered to not result in a significant effect.

Ecological Receptors

13.4.48 The methodology for this assessment follows the IAQM and Natural England guidance documents (Holman *et al.*, 2020) (Natural England, 2018).

13.4.49 Annual mean NOx concentrations were predicted and compared against the long-term air quality standard (30 µg/m^3).

13.4.50 For ecological sites, where NOx concentrations are predicted to be below the air quality standard, no significant effects would be anticipated. For those sites where NOx concentrations are predicted to be above the air quality standard, then a judgment of significance, by an ecologist, can be made once an assessment of nitrogen deposition has been undertaken for the site.

13.4.51 A further assessment has therefore been undertaken for ecological receptors to predict the change in nitrogen deposition as a result of the Project for those receptors at which NOx concentrations are above the air quality standard of 30 µg/m^3. Nitrogen deposition rates and information on sensitive habitats for the designated sites have been taken from the most recent data on the APIS website (Centre for Ecology and Hydrology, 2021) in consultation with the Project ecologists.

13.4.52 An assessment of nitrogen deposition has been undertaken for the four sites included in the HRA, even when NO_x concentrations are predicted to be below the air quality standard of 30µg/m^3. These ecological sites were Ashdown Forest SPA/SAC, Thames Basin Heaths (M25 site) SPA, Thames Basin Heaths (M3 site) SPA/SAC and Mole Gap to Reigate Escarpment SAC). Further details and the assessment methodology are included in Appendix 13.4.1.

13.4.53 For an assessment of nitrogen deposition, NOx has first been converted to NO_2 using the Clapp and Jenkin (2001) approach, and then the nitrogen deposition rate has been calculated as follows:

- NO_2 concentrations (µg/m^3) were multiplied by the relevant deposition velocity (0.0015 m/s for grassland and 0.003 m/s for forest habitats); and
- the resulting value (µg NO_2/m^2/s) was converted to kg N/ha/yr using a factor of 96 (ie converting from NO_2 to nitrogen using the molecular mass).

13.4.54 Where the long-term process contribution (PC) (the predicted change in concentrations of nitrogen deposition due to the Project) is predicted to be less than 1 per cent of the long-term environmental standard (this is the critical load in the case of assessing nitrogen deposition for ecological sites) then no significant effects would be anticipated (Holman *et al.*, 2020) (Natural England, 2018).

13.4.55 These calculations were carried out for the baseline and future year assessment scenarios at sensitive receptor locations at the designated ecological sites in the study area. The resulting change in nitrogen deposition due to the Project was compared against the lower critical level for each ecological site as a precautionary measure.

13.4.56 Sulphur emissions from road vehicles, aircraft engines and other airport sources would not significantly affect the acidity at the ecological sites, therefore acidity has not been assessed with regards to sulphur. Acidity from nitrogen has been taken into account in the four sites considered in the HRA. The short-term guideline for 24-hour NOx concentrations has also not been assessed, since the long-term critical loads are the key determinants of impact on the ecological sites.

13.5. Assumptions and Limitations of the Assessment

13.5.1 In June 2021 GAL published its updated Decade of Change (Sustainability) Strategy for the airport (Gatwick Airport Limited, 2021). Building on its previous Decade of Change (2010- 2020) Strategy, this new 10-year strategy sets out policies and goals for the period up to 2030, including further reductions in airport and surface access emissions. Information underpinning the air quality modelling results reported in this PEIR chapter pre-date the updated Strategy and therefore do not reflect GAL's latest goals to reduce emissions in respect of energy plant and heating demand. The ES will provide an updated air quality assessment taking into account the latest Decade of Change Strategy.

13.5.2 The traffic data available for the PEIR was defined by the TRA provided by the transport consultants (Chapter 12: Traffic and Transport).

13.5.3 Although the potential effects of NOx derived nitrogen deposition are an established basis for assessment, there is no guidance currently on how to model the potential effects of ammonia derived deposition. Discussions are ongoing with Natural England and Highways England, on this issue and, if necessary, how to appropriately calculate ammonia emissions and any other relevant input assumptions to include in the assessment. The assessment for the PEIR has focussed on the potential effects of NOx derived nitrogen deposition only for ecological sites. However, pending these further discussions with key stakeholders, the assessment may be refined and updated where required to consider ammonia as part of the ES in support of the DCO application.

13.5.4 For the PEIR, pollutant concentrations have been predicted at discrete sensitive human and ecological receptors within the study area. Contour mapping of pollutant concentrations for the 11 km by 10 km study area will be included in the ES.

13.5.5 This assessment has been based on estimates of how the aircraft fleet will transition over time, based on assumptions around airlines' fleet procurement programmes and business models. The 'central case' used in this assessment is based on what is considered today to be the most likely rate of fleet transition. Any implications of a slower transition fleet will be reviewed for the ES.

13.5.6 If further information identifies the potential for excavation of any odorous materials during construction then an odour assessment will be undertaken as part of the ES.

13.5.7 No detailed assessment of construction plant has been undertaken. It is assumed that best practice measures and low emission plant will be used during construction to minimise any potential air quality effects and would be implemented through the CoCP.

13.5.8 Full details of the assumptions and limitations of the air quality assessment are provided in Appendix 13.4.1. The approach taken is considered to provide a robust assessment on the basis of the data available at the time of the PEIR.

13.6. Baseline Environment

Current Baseline Conditions

Local Air Quality Management

13.6.1 There are two AQMAs (declared by Crawley Borough Council and Reigate and Banstead Borough Council in their administrative areas) within the 11 km by 10 km domain centred on the airport.

13.6.2 The Horley AQMA (amended to AQMA No.3 in 2003) was declared by Reigate and Banstead Borough Council in 2002 and encompasses an area of the south west quadrant of Horley to the north of the airport, including Riverside Garden Park. The Hazelwick AQMA, to the south of the airport, was declared by Crawley Borough Council in 2015 and encompasses the Hazelwick roundabout and areas along the adjoining roads; the A2011 Crawley Avenue, Hazelwick Avenue, the A2004 Northgate Avenue and Gatwick Road. The Hazelwick AQMA is currently in the process of being extended to "*include the Three Bridges area, forming a single extended 'Crawley AQMA*" (Crawley, 2021). This will add an additional area onto the south eastern 'arm' of the current AQMA. Consultation has ended and the extension recommendation has been approved.

13.6.3 Both AQMAs have been designated for exceedances of the annual mean NO_2 air quality standard and their locations are presented in Figure 13.4.1. Other AQMAs in the wider study area were also considered in this air quality assessment (total of 21 AQMAs in the wider study area). The full list of receptor results in the AQMAs are detailed in Appendix 13.9.1.

Local Monitoring Data

13.6.4 There are five continuous monitoring sites currently in operation within the 11 km by 10 km domain centred on Gatwick Airport and a wide network of diffusion tubes operated by the local planning authorities (Figure 13.6.1). The locations of the continuous monitoring sites are mainly urban background sites and there is one airport site (LGW3) at the eastern end of the main runway. Latest available monitoring data for the continuous monitors over a five-year period from 2015 to 2019 are presented in Table 13.6.1. It can be observed that annual mean NO_2 concentrations over this period have consistently been well below the air quality standard of 40 µg/m^3 at these sites. There were also no exceedances of the 1-hour mean NO_2 standard of 200 µg/m^3 at any of these sites.

13.6.5 Diffusion tube measurements of NO_2 concentrations at roadside locations operated by the local authorities along the A23 Brighton Road and around Hazelwick roundabout have exceeded the air quality standard over the past few years. Exceedances of the NO_2 air quality standard of 40 µg/m^3 were also recorded in 2018 during the air quality monitoring survey undertaken at these locations on behalf of GAL. Full details of the diffusion tube monitoring survey results are presented in Appendix 13.6.1.

13.6.6 Measurements of PM_{10} concentrations are undertaken at the RG1, CA2 and LGW3 continuous monitoring sites near the airport. Measurements of PM_{10} have been well below the air quality

standard (annual mean) of 40 µg/m^3 at these sites over the period (Table 13.6.1) and there were also no exceedances of the 24-hour mean standard of 50 µg/m^3 at any of the sites. No monitoring of $PM_{2.5}$ concentrations is undertaken in the area.

Table 13.6.1: Continuous Monitoring Data

Site	2015	2016	2017	2018	2019
Annual mean NO_2 (µg/m^3)					
RG1 Horley	21.1	20.3	20.4	18.8	19.1
RG2 Horley South East**	26.4	28.7	*N/A*	*N/A*	*N/A*
RG6 Horley South East**	*N/A*	28.3**	26.7	24.9	24.2
RG3 Poles Lane	14.0	16.7	13.9	15.5	15.1
CA2 Gatwick East	22.0	29.0	28.0	25.0	25.0
LGW3 Airport	30.0	30.0	29.0	30.0	29.0
Annual mean PM_{10} (µg/m^3)					
RG1 Horley	19.2	16.5	16.2	17.1	15.9
CA2 Gatwick East	15.0*	18.0*	18.0*	18.0*	21.0*
LGW3 Airport	22.0	17.0	19.0	19.0	14.0

* data capture below 90%

** The RG2 Horley South East monitoring site closed in 2017. It was replaced by the RG6 Horley South East site which was installed at the end of 2016 approximately 30 metres away from the RG2 site.

Background Concentrations

13.6.7 The Defra website (Defra, 2021c) includes estimated background air pollution concentrations for NOx, PM_{10} and $PM_{2.5}$ for each 1 km by 1 km OS grid square in the UK. The data are available for a reference year of 2018 and forecast annually until 2030. Background pollutant concentrations for each year of assessment have been obtained for the grid squares in the study area. Background concentrations for 2030 (latest year of data available) have been used for the interim assessment year (2032).

13.6.8 The air quality assessment has included major roads and aircraft sources explicitly in the model. Therefore, background concentrations attributed to these sources have been removed from the total background concentrations to avoid double-counting. The sectors removed from the background concentrations are the in-squares and out-squares of motorways, trunk A roads, primary A roads and aircraft within the 11 km by 10 km domain. In the wider study area only in-squares of motorways, trunk A roads and primary A roads were removed. In-squares refer to the contribution of emissions from within the specified 1 km by 1 km grid square and out-squares refer to contribution of emissions from outside of the specified 1 km by 1 km grid square. The Defra background concentrations used for the modelled receptors are presented in Appendix 13.6.2.

Ecological Receptors

13.6.9 The following statutory and non-statutory designated ecological sites across the study area have been included in this assessment:

- nine SSSIs: Banstead Downs, Buchan Hill Ponds, Epsom and Ashtead Commons, Glover's Wood, Ockham and Wisley Commons, Reigate Heath, Riddlesdown, Titsey Woods, Westerham Wood;
- five LNRs: Edolph's Copse, Grattons Park, Ockham and Wisley, Old Lodge Nutley, Willoughby Fields;
- the Mole Gap to Reigate Escarpment SAC;
- the Ashdown Forest SPA/SAC/SSSI;
- the Thames Basin Heaths SPA;
- the Thursley, Ash, Pirbright and Chobham SAC; and
- several ancient woodland sites.

13.6.10 As per the human receptors, the sensitive ecological receptor locations assessed vary for each assessment scenario, depending on the extent of the modelled traffic network. Baseline conditions for the ecological site closest to the airport (Glover's Wood SSSI) and the four sites for which HRAs were undertaken (Ashdown Forest SPA/SAC; Thames Basin Heaths SPA; Thursley, Ash, Pirbright and Chobham SAC; and Mole Gap to Reigate Escarpment SAC) are presented in the following paragraphs with a full list of all ecological sites assessed and background concentrations for each scenario presented in Appendix 13.6.2.

13.6.11 Data for Glover's Wood SSSI were obtained from the APIS website (Centre for Ecology and Hydrology, 2021). The most sensitive habitat at this site in relation to nutrient nitrogen is broad-leaved, mixed and yew woodland. The relevant nitrogen critical load class is for *meso- and eutrophic Quercus woodland* with a lower value of 15 kg N/ha/yr. The minimum background deposition rate at this site is 25.7 kg N/ha/yr as a three-year average (2017 – 2019).

13.6.12 Data for Ashdown Forest SPA/SAC were obtained from the APIS website (Centre for Ecology and Hydrology, 2021) and confirmed with the Project ecologists. The most sensitive habitat at this site in relation to nutrient nitrogen is the heathland with a critical load of 10-20 kg N/ha/yr. The minimum background deposition rate at this site is 22.7 kg N/ha/yr as a three-year average (2017 – 2019).

13.6.13 Data for Thames Basin Heaths SPA/SAC and Thursley, Ash, Pirbright and Chobham SAC were obtained from the APIS website (Centre for Ecology and Hydrology, 2021) and confirmed with the Project ecologists. The most sensitive habitat at these sites in relation to nutrient nitrogen is the heathland with a critical load of 10-20 kg N/ha/yr. The minimum background deposition rate at is 21.6 kg N/ha/yr as a three-year average (2017 – 2019).

13.6.14 Data for Mole Gap to Reigate Escarpment SAC were obtained from the APIS website (Centre for Ecology and Hydrology, 2021) and confirmed with the Project ecologists. The most sensitive habitat at this site in relation to nutrient nitrogen is the grassland with a critical load of 15-25 kg N/ha/yr. The minimum background deposition rate at this site is 25.0 kg N/ha/yr as a three-year average (2017 – 2019).

Odour Complaints from the Past Five Years

13.6.15 Complaints of odour near airports are sometimes received in connection with oily droplets and/or fuel dumping. Fuel dumping does not occur at or near to the airport and it is therefore unlikely that this would be responsible for odour complaints. Other complaints, however, may correlate with the airport activity (eg long hold times, aircraft engine testing, refuelling) and the wind direction at the time of the complaint. Odour could arise from airport sources due to the release of vapour when tanks are being filled or, more commonly, due to unburnt hydrocarbons.

13.6.16 It is changes in odour concentration that give rise to complaints, as people can become used to a persistent level of odour, but changes in odour may occur over a short timescale and due to the turbulence in the atmosphere will not be uniform across an area. This makes odour difficult to measure in real time.

13.6.17 Data was requested from Crawley Borough Council and Reigate and Banstead Borough Council of any odour complaints received in the last five years. The following section looks qualitatively at the results.

13.6.18 Complaint information is a useful source of data to assist in assessing the odour environment of an area, however, it does have its limitations. In an EA research report (Environment Agency, 2002) it states that:

"Complaints registration provides an insight into the prevalence of a symptom of odour annoyance, not in the prevalence of the annoyance itself. There are many factors at play that determine the ease or difficulty of registering a complaint. Therefore, complaint data must be interpreted with some caution. Registered complaints are a very strong indication that odour nuisance is a reality in a specific situation. However, the absence of registered complaints does not necessarily indicate the absence of nuisance. Also, once a conflict situation develops over emissions of odour, the registering of complaints can become a tool in the fight, when residents use orchestrated complaints as a political lever to move the argument in their favour".

13.6.19 Complaints data can therefore provide an indication that there is annoyance in the community but has its limitations in determining the actual scale of odour exposure experienced and the number of people affected. In research published in a peer reviewed journal (Bull and Fromant, 2014) it was confirmed that the number of complaints received has little relationship with the level of odour exposure experienced.

13.6.20 Complaints are submitted directly to the local planning authority. There were five formal complaints received by Crawley Borough Council and 12 by Reigate and Banstead Borough Council over the period, with the latest complaints for both councils being in 2019. An informal survey between 4th December 2019 and 28th January 2020 was also undertaken by a local resident at Horley Gardens Estate (at various locations to the north of the airport).

13.6.21 There are currently no established criteria for determining how significant the number of complaints received are for a site. As the EA report notes, there are several factors that influence the number of complaints received and it is not possible to compare one site with another as factors such as exposure and the scale of population exposed will differ. The trends in the number of complaints received is harder to interpret. Research suggests that complaints increase when the profile of a site has been raised, for example when a new planning application is made

or following an incident at a site (Bull and Fromant, 2014). From the 17 formal complaints received the majority are from 2016 and 2017 suggesting greater odour problems across those two years in the local area. Four out of the five Crawley complaints specify 'aviation/jet fuel' or 'kerosene' in the complaint descriptions.

13.6.22 Data from the meteorological station at Gatwick Airport shows that the predominant wind direction at the site is from the south west. When the wind direction is from the site towards the location where the complaint was received then the airport is a possible source of the odour. If the wind direction is in the opposite direction, then it is unlikely that it is the source of the odour. Many factors affect the wind direction therefore although it is predominantly from the south west the spreading of the odour and difference between the wind direction and the direction to the complainants' location can vary with factors such as wind speed (difference could be higher in low wind speeds where the wind direction tends to meander).

13.6.23 Outwood is stated as the location of the odour experienced in eight of the complaints across the two local planning authorities. The village is located to the north east of the airport. Additional locations stated are Picketts Lane (north/north east of the airport), Williamson Road (north east of the airport), Newdigate (north west of the airport) and Gatwick Airport railway station (on the eastern boundary of the airport). Locations to the north east of the airport could be credible sources of odour given the predominantly south westerly wind however in low wind speeds where the wind direction tends to meander this could differ and the distances of the complaints are quite far from the airport – Outwood village is approximately 5 km from the eastern boundary.

13.6.24 As locations were not provided for all odour complaints it is not possible to determine whether the airport is the likely cause of the majority of the odour complaints in the surrounding area over the past five years. Further investigation into the odour complaints will be undertaken for the ES.

Emissions Inventory

13.6.25 Table 13.6.2 presents a summary of the estimated annual NOx, PM_{10} and $PM_{2.5}$ emissions for the baseline year of 2018 for all sources across the study area.

13.6.26 Emissions have been estimated to be 6,434 t/yr for NOx, 344 t/yr for PM_{10} and 224 t/yr for $PM_{2.5}$ in the existing 2018 baseline scenario. Airport-related emissions have been estimated to be 2,030 t/yr for NOx, 48 t/yr for PM_{10} and 34 t/yr for $PM_{2.5}$. It can be observed that the largest emission source for NOx, PM_{10} and $PM_{2.5}$ is non-airport road vehicles. This is due to the large extent of the road network modelled, encompassing all roads in both the first full year of opening and interim assessment year scenarios.

Table 13.6.2: Summary of Annual Pollutant Emissions for the 2018 Baseline

Source	NOx (t/yr)	PM_{10} (t/yr)	$PM_{2.5}$ (t/yr)
Aircraft in the air			
Approach	213.6	1.8	1.8
Initial climb	276.7	1.0	1.0
Climb out	434.0	1.8	1.8
Aircraft on the ground			
Landing	1.6	<0.1	<0.1
Reverse thrust	14.3	0.2	0.2
Taxiing	123.5	2.2	2.2
Hold	64.2	1.2	1.2
Take-off	380.6	1.6	1.6
Brake & tyre wear	N/A	5.6	2.8
APUs	64.7	1.4	1.4
Engine testing	0.6	<0.1	<0.1
Ground equipment			
GSE	34.5	3.2	1.8
Fixed plant			
Fire training ground	0.1	<0.1	<0.1
Energy plant	25.8	0.2	0.2
Car parks			
Car parks	2.6	0.2	0.1
Roads			
Airport	392.9	27.8	17.9
Non-airport	4,404.1	295.9	190.3
Total (all sources)	**6,434**	**344**	**224**
Total (airport-related)	**2,030**	**48**	**34**

Future Baseline Conditions

13.6.27 The future baseline conditions have been established taking into account committed developments in the area and anticipated emissions from the airport's operation and road traffic without the Project.

Future Background Pollutant Concentrations

13.6.28 Background concentrations for the future assessment years were obtained from the Defra background maps. The Defra background maps predict pollutant concentrations up to 2030. Therefore 2030 background concentrations were used for the 2032 assessment year. This is a

conservative approach, since background concentrations are anticipated to improve in future years. The background concentrations used in the assessment are presented in Appendix 13.6.2.

Future Road Traffic Emissions

13.6.29 Road traffic emissions for the future assessment years were obtained from the Defra EFT (Defra, 2020b). The EFT includes road traffic emission factors up to 2030. Therefore, 2030 emissions were used for the 2032 assessment year. This is a conservative approach, since road traffic emissions are anticipated to improve in future years due to changes in fleet composition, the introduction of cleaner vehicles in the fleet and increased uptake of electric vehicles.

First Full Year of Opening: 2029

13.6.30 A summary of the estimated annual NOx, PM_{10} and $PM_{2.5}$ emissions for the 2029 future baseline year for all sources is presented in Table 13.6.3. Emissions have been estimated to be 2,794 t/yr for NOx, 176 t/yr for PM_{10} and 109 t/yr for $PM_{2.5}$. Airport-related emissions have been estimated to be 1,075 t/yr for NOx, 41 t/yr for PM_{10} and 28t/yr for $PM_{2.5}$.

Table 13.6.3: Summary of Annual Pollutant Emissions for the 2029 Future Baseline

Source	NOx (t/yr)	PM_{10} (t/yr)	$PM_{2.5}$ (t/yr)
Aircraft in the air			
Approach	238.0	1.8	1.8
Initial climb	342.3	1.0	1.0
Climb out	484.3	1.7	1.7
Aircraft on the ground			
Landing	1.1	<0.1	<0.1
Reverse thrust	15.8	0.2	0.2
Taxiing	139.6	2.1	2.1
Hold	86.6	1.3	1.3
Take-off	422.8	1.4	1.4
Brake & tyre wear	N/A	6.6	3.3
APUs	72.0	1.5	1.5
Engine testing	0.7	<0.1	<0.1
Ground equipment			
GSE	15.2	2.4	1.2
Fixed plant			
Fire training ground	0.1	<0.1	<0.1
Energy plant	25.2	0.2	0.2
Car parks			
Car parks	2.0	0.2	0.2

Source	NOx (t/yr)	PM_{10} (t/yr)	$PM_{2.5}$ (t/yr)
Roads			
Airport	129.5	21.2	12.6
Non-airport	818.6	134.5	80.3
Total (all sources)	**2,794**	**176**	**109**
Total (airport-related)	**1,975**	**41**	**28**

Interim Assessment Year: 2032

13.6.31 The source apportionment of the estimated annual NOx, PM_{10} and $PM_{2.5}$ emissions for the 2032 future baseline for all sources is presented in Table 13.6.4. Emissions have been estimated to be 2,854 t/yr for NOx, 217 t/yr for PM_{10} and 132 t/yr for $PM_{2.5}$. Airport-related emissions have been estimated to be 1,921 t/yr for NOx, 42 t/yr for PM_{10} and 28 t/yr for $PM_{2.5}$.

Table 13.6.4: Summary of Annual Pollutant Emissions for the 2032 Future Baseline

Source	NOx (t/yr)	PM_{10} (t/yr)	$PM_{2.5}$ (t/yr)
Aircraft in the air			
Approach	232.1	1.6	1.6
Initial climb	348.4	0.8	0.8
Climb out	455.0	1.4	1.4
Aircraft on the ground			
Landing	0.9	<0.1	<0.1
Reverse thrust	15.1	0.1	0.1
Taxiing	138.2	1.8	1.8
Hold	85.7	1.1	1.1
Take-off	409.1	1.2	1.2
Brake & tyre wear	N/A	6.8	3.4
APUs	68.2	1.5	1.5
Engine testing	0.6	<0.1	<0.1
Ground equipment			
GSE	14.0	2.3	1.2
Fixed plant			
Fire training ground	0.1	<0.1	<0.1
Energy plant	25.6	0.2	0.2
Car parks			
Car parks	2.0	0.2	0.2
Roads			

Source	NOx (t/yr)	PM_{10} (t/yr)	$PM_{2.5}$ (t/yr)
Airport	126.0	23.0	13.6
Non-airport	933.4	175.1	103.8
Total (all sources)	**2,854**	**217**	**132**
Total (airport-related)	**1,921**	**42**	**28**

Design Year: 2038

13.6.32 Table 13.6.5 presents a summary of the estimated annual NOx, PM_{10} and $PM_{2.5}$ emissions for 2038 design year future baseline scenario from all sources. Emissions have been estimated to be 2,837 t/yr for NOx, 215 t/yr for PM_{10} and 130 t/yr for $PM_{2.5}$. Airport-related emissions have been estimated to be 1,903 t/yr for NOx, 40 t/yr for PM_{10} and 26 t/yr for $PM_{2.5}$. The interim year (2032) road vehicle emissions have been included in the table as this scenario was not modelled for road traffic emissions (car parks and highway network). This is a conservative approach, since emissions are anticipated to improve in future years.

Table 13.6.5: Summary of Annual Pollutant Emissions of Aircraft Sources for the 2038 Future Baseline

Source	NOx (t/yr)	PM_{10} (t/yr)	$PM_{2.5}$ (t/yr)
Aircraft in the air			
Approach	230.5	1.3	1.3
Initial climb	348.0	0.6	0.6
Climb out	441.2	1.1	1.1
Aircraft on the ground			
Landing	0.9	<0.1	<0.1
Reverse thrust	14.7	0.1	0.1
Taxiing	138.1	1.4	1.4
Hold	85.5	0.9	0.9
Take-off	408.8	0.9	0.9
Brake & tyre wear	N/A	7.0	3.5
APUs	68.5	1.5	1.5
Engine testing	0.6	<0.1	<0.1
Ground equipment			
GSE	12.4	2.1	1.1
Fixed plant			
Fire training ground	0.1	<0.1	<0.1
Energy plant	26.2	0.2	0.2
Car parks			
Car parks	2.0	0.2	0.2

Source	NOx (t/yr)	PM_{10} (t/yr)	$PM_{2.5}$ (t/yr)
Roads			
Airport	126.0	23.0	13.6
Non-airport	933.4	175.1	103.8
Total (all sources)	**2,837**	**215**	**130**
Total (airport-related)	**1,903**	**40**	**26**

13.7. Key Project Parameters

13.7.1 The assessment has been based on the parameters identified in Chapter 5: Project Description. Table 13.7.1 identifies the key parameters relevant to this assessment. Where options exist, the maximum design scenario selected is the one having the potential to result in the greatest effect on an identified receptor or receptor group. Effects of greater adverse significance are not predicted to arise should any other option identified in Chapter 5 be taken forward in the final design of the Project.

Table 13.7.1: Maximum Design Scenarios

Potential Impact	Maximum Design Scenario	Justification
Initial Construction Phase: 2024-2029		
Construction dust soiling and human health risk/impact on ecological receptors	Construction activities for airfield alterations.	Due to the scale of the construction related activities and proximity to sensitive receptors, this would represent a maximum impact and therefore worst case.
First Full Year of Opening: 2029		
Human health and ecological impacts	Passenger Air Transport Movements (ATMs) based on forecast data. Assume surface access construction works overlap with airport operation.	The number and types of ATMs will affect aircraft and road traffic emissions which would affect air pollutant concentrations at sensitive receptors (human and ecological).
Interim Assessment Year: 2032		
Human health and ecological impacts	Passenger ATMs based on forecast data.	The number and type of ATMs will affect aircraft and road traffic emissions which would affect air pollutant concentrations at sensitive receptors (human and ecological).
Design Year: 2038		
Human health and ecological impacts	Passenger ATMs based on forecast data.	The number and type of ATMs will affect aircraft and road traffic emissions which could affect air pollutant concentrations at sensitive receptors (human and ecological).

13.8. Mitigation and Enhancement Measures Adopted as Part of the Project

13.8.1 A number of measures have been designed into the Project to reduce the potential for impacts on air quality. These are listed in Table 13.8.1.

Table 13.8.1: Mitigation and Enhancement Measures

Measures Adopted as Part of the Project	Justification
Mitigation	
Construction dust	Air quality mitigation measures are proposed to ensure best practice is followed for all on-site activities during construction. Measures from the IAQM guidance (Holman *et al.*, 2014) would be implemented through the CoCP, an outline of which is provided in Appendix 5.3.1. These measures will include the development and implementation of a Dust Management Plan (DMP), which may include controlling of other emissions, approved by the local planning authority. Dust suppression measures using water spraying, covering of dusty materials and speed limits on-site will be included. Further details of the measures for works to be carried out are provided in Appendix 13.8.1.
Construction plant and machinery	Low emission plant will be used during construction of the Project elements. The Decade of Change to 2030 document published in 2021 commits to mobile construction equipment meeting zero or ultra-low emission standards by 2030 (Gatwick Airport Limited, 2021).
Construction traffic	There will be a Construction Traffic Management Plan to reduce construction traffic and minimise impacts on the highway network. Construction traffic routing will direct traffic through the M23 Junction 9 in order to avoid any routing through the M23 Junction 10 and Hazelwick AQMA. There will also be a Construction Workforce Travel Plan with measures encouraging more sustainable travel patterns.
Operational traffic	Traffic during operation of the Project would be managed through the Airport Surface Access Strategy and the Travel Plan for Gatwick. The Airport Surface Access Strategy and Travel Plan to be submitted as part of the DCO application will set targets around increasing passenger and staff public transport mode share and set out the actions intended to deliver the same.
Airport operation	In relation to aircraft emissions on the airfield, the airport has provision for fixed electrical ground power (FEGP) on any new stands. In relation to other airport emissions, the airport is using airside electric vehicles. The Decade of Change to 2030 document published in 2021 commits to all on-airport vehicles and ground support equipment meeting zero or ultra-low emission standards by 2030 (Gatwick Airport Limited, 2021).
Combustion plant	The airport will continue improving heat generation and supply efficiencies with the replacement of older gas boilers and heat networks with the latest technology. The draft energy strategy also includes a transition of GAL's heating systems from a reliance on natural gas to electric heat pumps (using a variety of heat sources,

Measures Adopted as Part of the Project	Justification
	including air, water and sewage), retaining some of the most recent gas boilers as back-up/peaking plant.
Monitoring	
Air quality monitoring	Between June 2016 and March 2020, GAL undertook air quality monitoring using diffusion tubes for NO_2 concentrations at key areas of concern around the airport. The airport also carries out continuous monitoring at the eastern end of the main runway (LGW3 monitoring site). GAL contributes to the annual costs of the local monitoring carried out by local planning authorities and this will continue in the future. Dust monitoring during construction will also be undertaken should it be required.
Enhancement	
No air quality specific measures identified at this stage.	

13.9. Assessment of Effects

Model Verification

13.9.1 Model verification was undertaken using monitoring data for the Baseline 2018 scenario. Different adjustment factors for road traffic emissions were derived at different locations in the study area. With the application of these adjustment factors the majority of the modelled NO_2 concentrations were within ±25% of the monitored values, as defined in the Defra TG16 guidance. Details of the methodology for the model verification are presented in Appendix 13.6.1.

Initial Construction Phase: 2024-2029

Construction Dust Assessment

13.9.2 This section provides a summary of the results of the assessment of construction-related activities on air quality. The Project would require demolition, construction and earthworks, with associated trackout[3]. Separate construction dust assessments have been conducted for each element of the Project set out in Section 5.3 of Chapter 5: Project Description. The assessment has been split by Project element due to the differences in dust emission magnitudes of construction-related activities and the sensitivity of the area. Table 13.9.1 presents the Project elements and the associated dust generating activities from each element. The detailed assessment is presented in Appendix 13.9.1.

[3] Trackout is defined as "*The transport of dust and dirt from the construction/demolition site onto the public road network, where it may be deposited and then re-suspended by vehicles using the network. This arises when heavy duty vehicles (HDVs) leave the construction/demolition site with dusty materials, which may then spill onto the road, and/or when HDVs transfer dust and dirt onto the road having travelled over muddy ground on site*" (Holman *et al.*, 2014).

Table 13.9.1: Construction-related Activities Associated with each Project Element

Project Element	Construction-related Activity			
	Demolition	Earthworks	Construction	Trackout
Early works, establishment of compounds, fencing, early clearance and diversion works and re-provision of essential replacement services	Yes	Yes	Yes	No
Reconfiguration of existing maintenance airfield facilities	Yes	Yes	Yes	No
Alterations to the existing northern runway	Yes	Yes	Yes	No
Airfield works to support use of realigned northern runway	Yes	Yes	Yes	No
Pier 7	Yes	Yes	Yes	No
Extensions to North and South Terminals	Yes	Yes	Yes	No
Hotel and commercial facilities	Yes	Yes	Yes	No
Car parking	Yes	Yes	Yes	No
Surface access improvements	Yes	Yes	Yes	No
Reinstatement of final use at temporary construction compound locations	Yes	Yes	Yes	No
Flood compensation areas	No	Yes	No	No
Environmental mitigation	Yes	Yes	No	No
Access to construction	No	No	No	Yes

13.9.3 Trackout associated with the construction-related activities has only been considered for the access to contractor compounds as details of daily heavy goods vehicle (HGV) movements for each Project element are not available at this stage. Should this information be available for the ES, the assessment will be updated accordingly.

Sensitive Receptors

13.9.4 Sensitive receptors are defined as those residential properties/schools/hospitals that are likely to experience a change in pollutant concentrations and/or dust nuisance due to the construction and operation of the Project.

13.9.5 A 'high sensitivity receptor' is where "*the people or property would reasonably be expected to be present continuously*" such as dwellings and museums; a 'medium sensitivity receptor' is where "*the people or property wouldn't reasonably be expected to be present here continuously or regularly for extended periods*" such as parks and places of work; and a 'low sensitive receptor' is where "there is transient exposure, where the people or property would reasonably be expected to be present only for limited periods of time" such as footpaths and short term car parks (Holman *et al.*, 2014).

13.9.6 There are 'medium sensitivity receptors' located within 20 metres of the extensions to the North and South Terminals, car parking, surface access improvements, environmental mitigation and access to construction areas. There are also 'high sensitivity receptors' within 20 metres or 50 metres of some of the Project elements (Figure 13.9.1 to Figure 13.9.12).

13.9.7 There are no statutory designated ecological receptors within 50 metres of the Project elements. The closest statutory designated ecological receptor is Glover's Wood SSSI, located approximately 1.6 km from the Project. Therefore, the construction dust impacts on ecological receptors have not been considered further in this assessment.

Dust Emission Magnitude

13.9.8 Following the IAQM guidance, the dust emission magnitude has been assigned for each dust-generating activity and for each Project element (Holman *et al.*, 2014). The majority of construction-related activities have a dust emission magnitude assigned to be large.

Sensitivity of the Area

13.9.9 For the car parking and flood compensation areas Project elements, the sensitivity of the area to dust soiling has been assigned as high according to the IAQM guidance, due to the presence of more than 100 high sensitivity receptors within 50 metres of the element boundaries (Holman *et al.*, 2014).

13.9.10 For the extensions to the North and South Terminals, surface access improvements and environmental mitigation, and access to construction Project elements, the sensitivity of the area to dust soiling has been assigned as medium according to the IAQM guidance, due to the presence of more than one medium sensitivity receptor within 20 metres of the element boundaries (Holman *et al.*, 2014).

13.9.11 For all other Project elements, the sensitivity of the area to dust soiling has been assigned as low according to the IAQM guidance, due to the presence of 'low sensitivity receptors' within 20 metres of the Project element boundaries (Holman *et al.*, 2014).

13.9.12 The annual average PM_{10} concentration estimated by Defra for the grid squares of the Project elements is less than 24 µg/m^3 for 2024. Therefore, the sensitivity of the area in terms of human health has been assigned as low.

Risk of Impacts

13.9.13 Taking into consideration the dust emission magnitude and the sensitivity of the area, the dust soiling risks for all Project elements were determined (Table 13.9.2). The risk of dust soiling impacts from the Project elements for trackout is medium with a range from low to high for demolition, earthworks and construction. The risk of human health impacts ranges from low to medium for demolition and is low for earthworks, construction and trackout.

13.9.14 Further details of the results of the construction dust assessment for each of the project elements are presented in Appendix 13.9.1. Best practice mitigation measures to minimise the risk of dust soiling and human health impacts are provided in Appendix 13.8.1.

Table 13.9.2: Risk of Impacts for Dust Soiling and Human Health in the Absence of Mitigation

Impact	Construction-related Activity			
	Demolition	Earthworks	Construction	Trackout
Dust soiling	Low to High	Low to High	Low to High	Medium
Human health	Low to Medium	Low	Low	Low

13.9.15 Following the implementation of appropriate mitigation, the effects of construction-related activities on dust soiling and human health would be negligible and the effects would therefore not be significant. The mitigation measures are applicable throughout the whole construction phase.

Construction Traffic Assessment (Construction Phase for Airfield Works)

Human Receptors

13.9.16 The modelled results for human receptors in 2024 are presented in Appendix 13.9.1 with all modelled human receptors shown in Appendix 13.6.2 (Figure 1.1.1 to Figure 1.1.4).

13.9.17 There are 52 receptors modelled in the Hazelwick AQMA. The highest annual mean NO_2 concentration is predicted to be 29.5 µg/m^3 at receptor R0132, located at Woodfield Road at the corner of the junction with Northgate Avenue (A2004). Northgate Avenue is one of the arms of the Hazelwick roundabout. The largest change in NO_2 concentrations due to the works in 2024 is predicted to be 0.1 µg/m^3 in the AQMA.

13.9.18 There are 85 receptors modelled in the Horley AQMA. The highest annual mean NO_2 concentration is predicted to be 31.3 µg/m^3 at receptor R0202. The largest change in NO_2 concentrations due to the airfield works construction phase in 2024 is predicted to be 0.5 µg/m^3 at receptors R0200 on Brighton Road (A23) and R0200 at Longbridge Road near Longbridge roundabout.

13.9.19 NO_2 concentrations at all receptors in the two AQMAs are predicted to be below the air quality standard in the airfield works construction phase, therefore this construction phase would not create exceedances of the air quality standards in these areas.

13.9.20 In the rest of the study area, there are seven predicted exceedances of air quality standards in annual mean NO_2 concentrations. However, the future baseline concentrations without the Project at these locations also exceed the air quality standard. The largest change (due to the Project construction works in 2024) at the receptors that exceed the air quality standard with and without the Project is 0.1 µg/m^3. The highest annual mean NO_2 concentration in 2024 is predicted to be 49.7 µg/m^3 at receptor R1042 on Thornton Road (A23).

13.9.21 The largest change in NO_2 concentrations due to the Project construction phase in 2024 is predicted to be 0.8 µg/m^3 at receptor R0605 on Green Road (the predicted concentration with the airfield construction works is predicted to be 33.4 µg/m^3). This is still below the air quality standard (40 µg/m^3).

13.9.22 Overall, three slight adverse impacts have been predicted at human receptors (R0605, R06056 and R0607) in 2024 due to the construction traffic for the airfield works for NO_2 concentrations,

with all other receptors predicted to experience negligible impacts. Therefore, no significant effects are predicted for NO_2 concentrations due to the construction of the airfield works.

13.9.23 No exceedances are predicted for annual mean PM_{10} concentrations. The highest annual mean PM_{10} concentration is predicted to be 20.9 µg/m^3 at receptor R1042 at Thornton Road (A23). The largest change in annual mean PM_{10} concentrations due to the construction of the Project in 2024 is predicted to be 0.1 µg/m^3. Overall, negligible impacts are predicted at all human receptors due to construction traffic for PM_{10} concentrations and therefore no significant effects are anticipated.

13.9.24 No exceedances are predicted for annual mean $PM_{2.5}$ concentrations. The highest annual mean $PM_{2.5}$ concentration is predicted to be 13.7 µg/m^3 at receptors R0602 (Church Road, Addlestone) and R1042 (Thornton Road – A23). The largest change in annual $PM_{2.5}$ concentrations due to the construction of the Project in 2024 is predicted to be 0.1 µg/m^3. Overall, negligible impacts are predicted at all human receptors due to the construction traffic for the airfield works for the Project for $PM_{2.5}$ concentrations and therefore no significant effects are anticipated for $PM_{2.5}$.

Ecological Receptors

13.9.25 The modelled results for ecological receptors are presented in Appendix 13.9.1.

Glover's Wood SSSI

13.9.26 The average annual mean NOx concentration predicted at Glover's Wood SSSI is 11.2 µg/m^3 with the Project in 2024. The highest predicted concentration (11.6 µg/m^3) is at the south eastern boundary of the site, located closest to Russ Hill Road to the west of the airport. The average change in annual mean NOx concentrations due to the Project in 2024 is predicted to be 0.1 µg/m^3 at the SSSI. No significant air quality effects are anticipated at this site.

Thames Basin Heaths SPA

13.9.27 The average annual mean NOx concentration predicted at Thames Basin Heaths SPA is 30.6 µg/m^3 with the Project in 2024. The highest predicted concentration (49.5 µg/m^3) is at the boundary of the site, located on the slip road at junction 10 of the M25. However, there is no change predicted at this site due to the Project in 2024 and therefore no significant air quality effects are anticipated.

Mole Gap to Reigate Escarpment SAC

13.9.28 The average annual mean NOx concentration predicted at Mole Gap to Reigate Escarpment SAC is 19.0 µg/m^3 with the Project in 2024. The highest predicted concentration (21.0 µg/m^3) is at the boundary of the site, near junction 8 of the M25. There is no change predicted at this site due to the Project in 2024 and therefore no significant air quality effects are anticipated.

Other Ecological Sites

In the first year of airfield construction works in 2024, annual mean NOx concentrations are predicted to be below the critical level/air quality standard of 30 µg/m^3 at all but nine ecological sites (Westerham Wood SSSI, Ockham and Wisley Commons SSSI, Ockham and Wisley LNR, and six ancient woodland sites). However, there is no change or reductions in NOx concentrations predicted at these sites due to the Project in 2024 and therefore no significant effects are anticipated. The only site that an increase in NOx concentrations is predicted due to

the Project is the unnamed woodland 6 (ancient woodland) site with a change of 0.1 µg/m^3. This change is unlikely to cause any significant air quality effects at this site.

Further Mitigation

13.9.29 No significant effects for air quality are anticipated for the first year of construction of airfield works (2024) as a result of the Project and therefore no further mitigation, other than that included in the Project, is proposed. As noted in Section 13.4 Assessment Methodology, the peak year of construction is closer to the end of the construction period. However, this scenario has assumed the peak construction traffic flows applied to the first year of construction (2024) as a worst case.

Future Monitoring

13.9.30 Since no significant effects have been predicted for air quality during construction, no further additional monitoring is proposed. GAL currently undertake air quality monitoring on the airport (LGW3 site) and it is anticipated the airport will continue this in the future.

Significance of Effects

13.9.31 No further mitigation or monitoring, than that included in the Project, is required and therefore the effects would remain not significant for air quality.

First Full Year of Opening: 2029

Construction Dust Assessment

13.9.32 Construction activities would continue during 2029. The assessment presented above for 2024-2029 has included all construction activities as a worst case. Therefore, effects would be no greater than those reported above.

Construction Traffic Assessment (Construction Phase for Surface Access Improvements)

Human Receptors

13.9.33 The modelled results for human receptors in 2029 are presented in Appendix 13.9.1 with all modelled human receptors shown in Appendix 13.6.2 (Figure 1.1.1 to Figure 1.1.4).

13.9.34 There are 52 receptors modelled in the Hazelwick AQMA. The highest annual mean NO_2 is predicted to be 25.7 µg/m^3 at receptor R0132, located at Woodfield Road at the corner of the junction with Northgate Avenue (A2004). The largest change in NO_2 concentrations due to the works in 2029 is predicted to be 0.4 µg/m^3 at receptors R0059 (Tinsley Close, Three Bridges) and R0147 (Crawley Avenue – A2011).

13.9.35 There are 85 receptors modelled in the Horley AQMA. The highest annual mean NO_2 concentration is predicted to be 26.6 µg/m^3 at receptor R0030. The largest change in NO_2 concentrations is predicted to be 0.4 µg/m^3 at receptor R0168. Receptor R0030 is located at The Crescent, Horley and receptor R0168 at Balcombe Road (B2036).

13.9.36 NO_2 concentrations at all receptors in the two AQMAs are predicted to be below the air quality standard in the surface access improvements construction phase, therefore this construction phase would not create exceedances of the air quality standards in these areas.

13.9.37 In the rest of the study area, there are no predicted exceedances in annual mean NO_2 concentrations. The largest change is predicted to be 1.5 µg/m^3 (from 18.9 µg/m^3 to 20.4 µg/m^3)

at a care home on Blanford Road. However, the predicted concentration is still well below the NO_2 air quality standard of 40 µg/m^3. The highest annual mean NO_2 concentration predicted in the surface access improvements phase (33.7 µg/m^3) is at the Gatwick Ambulance Station (H0329), but it is predicted that NO_2 concentrations will reduce at this receptor by 0.2 µg/m^3 during the construction phase in 2029.

13.9.38 These changes would relate to negligible impacts at all human receptors in 2029 due to the surface access improvements construction phase of the Project for NO_2 concentrations and therefore no significant effects are anticipated for NO_2.

13.9.39 No exceedances are predicted for annual mean PM_{10} concentrations. The highest annual mean PM_{10} concentration is predicted to be 20.2 µg/m^3 at receptor R0602 at Church Road, Addlestone. This is well below the air quality standard of 40 µg/m^3. The largest change in annual mean PM_{10} concentrations due to the construction of the Project in 2029 is predicted to be 0.4 µg/m^3 at Reigate Hill (A217) from 16.7 µg/m^3 to 17.1 µg/m^3. These changes would relate to negligible impacts at all human receptors due to the surface access improvements construction phase of the Project for PM_{10} concentrations and therefore no significant effects are anticipated for PM_{10}.

13.9.40 No exceedances are predicted for annual mean $PM_{2.5}$ concentrations. The highest annual mean $PM_{2.5}$ concentration is predicted to be 13.5 µg/m^3 at receptor R0602 at Church Road, Addlestone. This concentration is well below the air quality standard of 25 µg/m^3. The largest change in annual $PM_{2.5}$ concentrations due to the construction of the Project in 2029 is predicted to be 0.2 µg/m^3 at receptors CH0254 (care home on Blanford Road), R0863 (London Road – A217) and R1078 (Reigate Hill – A217). These changes would relate to negligible impacts at all human receptors due to the construction of the surface access improvements for the Project for $PM_{2.5}$ concentrations and therefore no significant effects are anticipated for $PM_{2.5}$.

Ecological Receptors

13.9.41 The modelled results for ecological receptors for the first year of surface access improvements (2029) are presented in Appendix 13.9.1.

Glover's Wood SSSI

13.9.42 The average annual mean NOx concentration predicted at Glover's Wood SSSI is 10.1 µg/m^3 with the Project in 2029. The highest predicted concentration (10.6 µg/m^3) is at the south eastern boundary of the site, located closest to Russ Hill Road to the west of the airport. The change in annual mean NOx concentrations due to the Project in 2029 is predicted to be 0.1 µg/m^3 at the SSSI. Therefore, no significant air quality effects are anticipated at this site.

Thames Basin Heaths SPA

13.9.43 The average annual mean NOx concentration predicted at Thames Basin Heaths SPA is 24.6 µg/m^3 with the Project in 2029. The highest predicted concentration (32.6 µg/m^3) is at the boundary of the site, located on the slip road at junction 10 of the M25. However, there is no change predicted at this site due to the construction for the surface access improvements in 2029 and therefore no significant air quality effects are anticipated.

Mole Gap to Reigate Escarpment SAC

13.9.44 The average annual mean NOx concentration predicted at Mole Gap to Reigate Escarpment SAC is 14.2 µg/m^3 with the Project in 2029. The highest predicted concentration (16.8 µg/m^3) is at the

boundary of the site, located near junction 8 of the M25. There is no change predicted at this site due to the Project in 2029 and therefore no significant air quality effects are anticipated.

Other Ecological Sites

13.9.45 In the first year of surface access improvements in 2029, annual mean NOx concentrations are predicted to be below the critical level/air quality standard of 30 µg/m^3 at all but two ecological sites (Huntsgreen Wood and unnamed woodland 5 ancient woodland sites). However, reductions in NOx concentrations are predicted at these sites due to the Project in 2029 and therefore no significant effects are anticipated.

Emissions Inventory

13.9.46 For the first full year of opening in 2029, the estimated annual NOx, PM_{10} and $PM_{2.5}$ emissions are presented in Table 13.9.3 broken down by each pollution source. Total emissions for this scenario have been estimated to be 2,914 t/yr for NOx, 178 t/yr for PM_{10} and 110 t/yr for $PM_{2.5}$ and 2,098 t/yr (NOx), 44 t/yr (PM_{10}) and 30 t/yr ($PM_{2.5}$) for airport-related emissions.

13.9.47 When compared to the 2029 future baseline scenario, ie without the Project (Table 13.6.3), it can be observed that the Project would result in an increase in emissions for all sources and pollutants. This is due to increases in aircraft movements and associated activities on the airport, as well as increases in road traffic. NOx emissions from aircraft are predicted to increase by 78.6 t/y for aircraft in the air and 44.9 t/y for aircraft on the ground. NOx emissions from airport-related traffic are predicted to increase by 122.7 t/y from the Project in 2029.

13.9.48 For airport-related PM_{10} and $PM_{2.5}$, the emissions are predicted to increase by 2.1 t/yr for PM_{10} and 1.4 t/yr for $PM_{2.5}$ for the first full year of opening in 2029 compared to the 2029 future baseline.

Table 13.9.3: Summary of Annual Pollutant Emissions for the First Full Year of Opening in 2029

Source	NOx (t/yr)	PM_{10} (t/yr)	$PM_{2.5}$ (t/yr)
Aircraft in the air			
Approach	254.9	1.9	1.9
Initial climb	367.2	1.0	1.0
Climb out	521.1	1.8	1.8
Aircraft on the ground			
Landing	1.1	<0.1	<0.1
Reverse thrust	16.9	0.2	0.2
Taxiing	157.5	2.3	2.3
Hold	74.1	1.1	1.1
Take-off	454.7	1.5	1.5
Brake & tyre wear	N/A	7.1	3.6
APUs	78.2	1.6	1.6
Engine testing	0.7	<0.1	<0.1

Source	NOx (t/yr)	PM_{10} (t/yr)	$PM_{2.5}$ (t/yr)
Ground equipment			
GSE	13.7	2.2	1.1
Fixed plant			
Fire training ground	0.1	<0.1	<0.1
Energy plant	18.5	0.1	0.1
Car parks			
Car parks	2.1	0.2	0.2
Roads			
Airport	136.9	22.5	13.4
Non-airport	815.9	134.1	80.1
Total (all sources)	**2,914**	**178**	**110**
Total (airport-related)	**2,098**	**44**	**30**

Modelled Concentrations

Human Receptors

13.9.49 The modelled results for human receptors for the first year of opening (2029) are presented in Appendix 13.9.1. All modelled human receptors are shown in Appendix 13.6.2 (Figure 1.1.1 to Figure 1.1.4).

13.9.50 There are 52 receptors modelled in the Hazelwick AQMA. The highest annual mean NO_2 concentration is predicted to be 25.6 µg/m^3 at receptor R0132, located at Woodfield Road at the corner of the junction with Northgate Avenue (A2004). Northgate Avenue is one of the arms of the Hazelwick roundabout. The largest change in NO_2 concentrations due to the Project in 2029 in this AQMA is predicted to be 0.1 µg/m^3.

13.9.51 There are 86 receptors modelled in the Horley AQMA. The highest annual mean NO_2 concentration is predicted to be 27.3 µg/m^3 at receptor R0030. The largest change in NO_2 concentrations due to the Project in 2029 in this AQMA is predicted to be 0.3 µg/m^3 at receptor R0039. Receptor R0030 is located at The Crescent in Horley and R0039 at Vernon Woodroyd Gardens, Horley.

13.9.52 Predicted NO_2 concentrations at all receptors in the two AQMAs would be below the air quality standard and the Project would therefore not create exceedances of the air quality standard in these areas.

13.9.53 In the rest of the study area, no exceedances are predicted in annual mean NO_2 concentrations. The highest annual mean NO_2 concentration is predicted to be 34.9 µg/m^3 at receptor H0329 (Gatwick Ambulance Station) with and without the Project in 2029. The largest change in NO_2 concentrations due to the Project in 2029 is predicted to be 0.8 µg/m^3 at receptor R0020 (Oakfields in Crawley). Predicted concentrations at this receptor with the Project are 23.9 µg/m^3. These changes would relate to negligible impacts at all human receptors in 2029 due to the Project for NO_2 concentrations and therefore no significant effects are anticipated for NO_2.

13.9.54 No exceedances are predicted for annual mean PM_{10} concentrations. The highest annual mean PM_{10} concentration is predicted to be 20.2 µg/m^3 at receptors R0571 (Ashcombe Road) and R0602 (Church Road, Addlestone). The largest change in annual mean PM_{10} concentrations due to the Project in 2029 is predicted to be 0.2 µg/m^3 at receptor R0020, Oakfields in Crawley. These changes would relate to negligible impacts at all human receptors due to the Project for PM_{10} concentrations and therefore no significant effects are anticipated for PM_{10}.

13.9.55 No exceedances are predicted for annual mean $PM_{2.5}$ concentrations. The highest annual mean $PM_{2.5}$ concentration is predicted to be 13.5 µg/m^3 at receptor R0602 at Church Road, Addlestone. The largest change in annual mean $PM_{2.5}$ concentrations due to the Project in 2029 is predicted to be 0.1 µg/m^3. These changes would relate to negligible impacts at all human receptors due to the Project for $PM_{2.5}$ concentrations and therefore no significant effects are anticipated for $PM_{2.5}$.

Ecological Receptors

13.9.56 The modelled results for ecological receptors for the first year of opening (2029) are presented in Appendix 13.9.1.

Glover's Wood SSSI

13.9.57 The average annual mean NOx concentration at Glover's Wood SSSI was predicted to be 10.1 µg/m^3 with the Project. The highest predicted concentration (10.6 µg/m^3) is at the south eastern boundary of the site, located closest to Russ Hill Road to the west of the airport. The average change in annual mean NOx concentrations due to the Project in 2029 is predicted to be 0.1 µg/m^3 at the SSSI. No significant air quality effects are anticipated at this site.

Thames Basin Heaths SPA

13.9.58 The average annual mean NOx concentration at Thames Basin Heaths SPA is predicted to be 24.4 µg/m^3 with the Project. The highest predicted concentration (32.4 µg/m^3) is at the boundary of the site, located on the slip road at junction 10 of the M25. However, there is no change predicted at this site due to the Project in 2029 and therefore no significant air quality effects are anticipated.

Mole Gap to Reigate Escarpment SAC

13.9.59 The average annual mean NOx concentration predicted at Mole Gap to Reigate Escarpment SAC is 14.9 µg/m^3 with the Project in 2029. The highest predicted concentration (16.4 µg/m^3) is at the boundary of the site, located near junction 8 of the M25. There is no change predicted at this site due to the Project in 2029 and therefore no significant air quality effects are anticipated.

Other Ecological Sites

13.9.60 In the first full year of opening in 2029, annual mean NOx concentrations are predicted to be below the critical level/air quality standard of 30 µg/m^3 at all but two ecological sites (Huntsgreen Wood and unnamed woodland 5 (ancient woodland) sites). Reductions in NOx concentrations are predicted at the unnamed woodland 5 (ancient woodland) site due to the Project in 2029 and therefore no significant air quality effects are anticipated.

13.9.61 An increase of 0.5 µg/m^3 in NOx concentrations is predicted at the Huntsgreen Wood ancient woodland site due to the project in 2029. An assessment of nitrogen (N) deposition was undertaken which predicted an increase of less than 0.1 kg N/ha/yr at the site at worst. This is

less than 1% of the site's lower critical load (10 kg N/ha/yr) and therefore no significant air quality effects are anticipated.

Further Mitigation

13.9.62 No significant effects for air quality are anticipated for the first full year of opening in 2029 as a result of the Project and therefore no further mitigation, than that included in the Project is proposed.

Future Monitoring

13.9.63 Since no significant effects have been predicted for air quality in 2029, no additional monitoring beyond that included in the Project is proposed. GAL currently undertake air quality monitoring on the airport (LGW3 site) and it is anticipated the airport will continue this in the future.

Significance of Effects

13.9.64 No further mitigation or monitoring, than the included in the Project, is required and therefore the effects would remain as not significant.

Interim Assessment Year: 2032

Construction Dust Assessment

13.9.65 Some construction activities would continue during 2032. The assessment presented for 2024-2029 has included all construction activities as a worst case. Therefore, effects would be no greater than those reported above.

Construction Traffic

13.9.66 The assessment presented for 2029 has included all construction traffic impacts that are likely to happen between 2029 and 2032 as a worse case.

Emissions Inventory

13.9.67 Table 13.9.4 presents the estimated annual emissions of NOx, PM_{10} and $PM_{2.5}$ for the interim assessment year of 2032 broken down by each pollution source. The total emissions for this scenario have been estimated to be 3,219 t/yr for NOx, 222 t/yr for PM_{10} and 136 t/yr for $PM_{2.5}$. The airport-related emissions have been estimated to be 2,293 t/yr for NOx, 48 t/yr for PM_{10} and 33 t/yr for $PM_{2.5}$.

13.9.68 When compared to the 2032 future baseline scenario, ie without the Project (Table 13.6.4), it can be observed that the Project would result in an increase in emissions for all sources and pollutants. This is due to increases in aircraft movements and associated activities on the airport, as well as increases in road traffic. NOx emissions from aircraft are predicted to increase by 217.1 t/yr for aircraft in the air and 142.8 t/yr for aircraft on the ground. NOx emissions from airport-related road traffic is expected to increase by 19.3 t/yr due to the Project in 2032.

13.9.69 For airport-related PM_{10} and $PM_{2.5}$, the emissions are predicted to increase by 6.6 t/yr for PM_{10} and 4.5 t/yr for $PM_{2.5}$ in total.

Table 13.9.4: Summary of Annual Pollutant Emissions for the Interim Assessment Year of 2032

Source	NOx (t/yr)	PM_{10} (t/yr)	$PM_{2.5}$ (t/yr)
Aircraft in the air			
Approach	281.4	1.9	1.9
Initial climb	419.8	1.0	1.0
Climb out	551.3	1.7	1.7
Aircraft on the ground			
Landing	1.1	<0.1	<0.1
Reverse thrust	18.1	0.2	0.2
Taxiing	177.6	2.2	2.2
Hold	83.4	1.1	1.1
Take-off	496.1	1.4	1.4
Brake & tyre wear	N/A	8.3	4.2
APUs	83.7	1.8	1.8
Engine testing	0.8	<0.1	<0.1
Ground equipment			
GSE	13.2	2.2	1.1
Fixed plant			
Fire training ground	0.1	<0.1	<0.1
Energy plant	18.6	0.1	0.1
Car parks			
Car parks	2.2	0.2	0.2
Roads			
Airport	145.3	26.4	15.8
Non-airport	926.1	173.8	103.0
Total (all sources)	**3,219**	**222**	**136**
Total (airport-related)	**2,293**	**48**	**33**

Modelled Concentrations

Human Receptors

13.9.70 The modelled results for human receptors for the interim assessment year (2032) are presented in Appendix 13.9.1. All modelled human receptors are shown in Appendix 13.6.2 (Figure 1.1.1 to Figure 1.1.4).

13.9.71 There are 52 receptors modelled in the Hazelwick AQMA. The highest annual mean NO_2 concentration within this AQMA is predicted to be 25.3 µg/m^3 at receptor R0132 at Woodfield Road. The largest change in NO_2 concentrations, in the AQMA, due to the Project in 2032 is predicted to be 0.1 µg/m^3.

13.9.72 There are 86 receptors modelled in the Horley AQMA. The highest annual mean NO_2 concentration within this AQMA is predicted to be 27.7 µg/m^3 at receptor R0030 (Greenings, The Crescent, Horley). The largest change in NO_2 concentrations due to the Project in 2032 is predicted to be 1.4 µg/m^3 at receptor R0082 at Riverside in Horley.

13.9.73 Predicted NO_2 concentrations at all receptors in the two AQMAs are below the air quality standard and the Project would therefore not create exceedances of the air quality standard in these areas.

13.9.74 In the rest of the study area, no exceedances are predicted in annual mean NO_2 concentrations. The highest annual mean NO_2 concentration is predicted to be 33.4 µg/m^3 at receptor H0329, located at Gatwick Ambulance Station. This is below the air quality standard of 40 µg/m^3 with an increase of 0.1 µg/m^3 predicted due to the Project. The largest change in NO_2 concentrations due to the Project in 2032 is predicted to be 1.5 µg/m^3 at receptor R0949 at A217 Brighton Road, increasing from 13.2 µg/m^3 to 14.7 µg/m^3. There are negligible impacts predicted at all human receptors. Therefore, in 2032 due to the Project there are no significant effects anticipated for NO_2 concentrations.

13.9.75 No exceedances are predicted for annual mean PM_{10} concentrations. The highest annual mean PM_{10} concentration is predicted to be 20.3 µg/m^3 at receptors R0571 (Ashcombe Road) and R0602 (Church Road, Addlestone). This is well below the air quality standard of 40 µg/m^3. The largest change in annual mean PM_{10} concentrations due to the Project is predicted to be 0.3 µg/m^3. These changes would relate to negligible impacts at all human receptors due to the Project for PM_{10} concentrations and therefore no significant effects are anticipated for PM_{10}.

13.9.76 No exceedances are predicted for annual mean $PM_{2.5}$. The highest annual mean $PM_{2.5}$ concentration due to the Project is predicted to be 13.6 µg/m^3 at receptor R0602 at Church Road, Addlestone. This is well below the air quality standard of 25 µg/m^3. The largest change in annual $PM_{2.5}$ concentrations due to the Project in 2029 is predicted to be 0.2 µg/m^3. These changes would relate to negligible impacts at all human receptors due to the Project for $PM_{2.5}$ concentrations and no significant effects are anticipated for $PM_{2.5}$.

Ecological Receptors

13.9.77 The modelled results for ecological receptors for the interim assessment year (2032) are presented in Appendix 13.9.1. Nitrogen and acid deposition assessments were undertaken for all HRA sites (Ashdown Forest SPA/SAC, Thames Basin Heaths SPA (site near the M25 junction 10), Thursley, Ash, Pirbright & Chobham SAC (site along the M3) and Mole Gap to Reigate Escarpment SAC) in 2032.

Glover's Wood SSSI

13.9.78 The average annual mean NOx concentration at Glover's Wood SSSI is predicted to be 10.1 µg/m^3 with the Project in 2032. The highest predicted concentration (10.6 µg/m^3) is at the south eastern boundary of the site, located closest to Russ Hill Road to the west of the airport. The average change in annual mean NOx concentrations due to the Project in 2032 is predicted to be 0.2 µg/m^3 at the SSSI. No significant air quality effects are anticipated at this site.

Ashdown Forest SPA/SAC

13.9.79 There are no predicted exceedances of the air quality standard of 30 µg/m^3 at the site in 2032. The largest predicted NOx concentration at Ashdown Forest SPA/SAC is 14.8 µg/m^3 along the A22, close to the edge of the road. The largest change in NOx concentrations at the SPA/SAC due to the Project is 0.1 µg/m^3 along the A22, close to the edge of the road.

13.9.80 An assessment of N deposition was undertaken for this site for inclusion in the HRA. The largest increase in N deposition due to the Project in 2032 is less than 0.1 kg N/ha/yr along the A22 close to the edge of the road. The change in N deposition is predicted to be less than 1% of the lower critical load for the site (10 kg N/ha/yr) and therefore no significant air quality effects are anticipated at this site.

13.9.81 The largest increase in acid deposition due to the Project is less than 0.1 keq/ha/yr. The change in acid deposition falls within the critical load function for this site and therefore no significant acidity effects are anticipated.

Thames Basin Heaths SPA (site near the M25 junction 10)

13.9.82 Exceedances of the air quality standard of 30 µg/m^3 are predicted at the edge of the site closest to the M25 and the A3 (up to approximately 20 metres from the A3). The largest predicted NOx concentration is 55.5 µg/m^3 approximately 1 metre from the edge of the A3 sliproad to the M25 junction 10. The largest change in NOx concentrations due to Project is 0.3 µg/m^3 at the edge of the site closest to the M25 on-slip from junction 10.

13.9.83 An assessment of N deposition was undertaken for this site for inclusion in the HRA. The largest increase in N deposition due to Project is less than 0.1 kg N/ha/yr approximately 1 metre at the edge of the site close the M25. The change in N deposition at the site is less than 1 per cent of the lower critical load for the site (10 kg N/ha/yr) and therefore no significant air quality effects are anticipated at this site.

13.9.84 The largest increase in acid deposition due to Project is less than 0.1 keq/ha/yr. The change in acid deposition falls within the critical load function for this site and therefore no significant acidity effects are anticipated.

Thursley, Ash, Pirbright & Chobham SAC

13.9.85 Exceedances of the air quality standard of 30 µg/m^3 are predicted at the edge of the site closest to the M3 (up to approximately 40 metres). The largest predicted NOx concentration is 71.6µg/m^3 approximately 1.6 metres from the edge of the M3. The largest change in NOx concentrations due to Project is 0.3 µg/m^3 at the edge of the B386 Chertsey Road within the site.

13.9.86 An assessment of N deposition was undertaken for this site for inclusion in the HRA. The largest increase in N deposition due to Project is less than 0.1 kg N/ha/yr at the edge of the site along the M3. The change in N deposition is less than 1 per cent of the lower critical load for the site (10 kg N/ha/yr) and therefore no significant air quality effects are anticipated at this site.

13.9.87 The largest increase in acid deposition due to Project is less than 0.1 keq/ha/yr. The change in acid deposition falls within the critical load function for this site and therefore no significant acidity effects are anticipated.

Mole Gap to Reigate Escarpment SAC

13.9.88 There are no exceedances of the air quality standard of 30 µg/m^3 predicted at this site in 2032. The largest predicted NOx concentration is 27.6µg/m^3 at the edge of the site closest to the M25. The largest change in NOx concentrations due to Project is 0.4 µg/m^3 at the edge of the site closest to the M25.

13.9.89 An assessment of N deposition was undertaken for this site for inclusion in the HRA. The largest increase in N deposition due to Project is less than 0.1 kg N/ha/yr at the edge of the site closest to the M25. The change in N deposition is less than 1 per cent of the lower critical load for the site (15 kg N/ha/yr) and therefore no significant air quality effects are anticipated at this site.

13.9.90 The largest increase in acid deposition due to Project is less than 0.1 keq/ha/yr. The change in acid deposition falls within the critical load function for this site and therefore no significant acidity effects are anticipated.

Other Ecological Sites

13.9.91 In the interim year of 2032, annual mean NOx concentrations are predicted to be below the critical level/air quality standard of 30 µg/m^3 at all but two ecological sites (Huntsgreen Wood and unnamed woodland 5 (ancient woodland) sites). However, only small increases in NOx concentrations are predicted at these sites due to the Project (up to 0.2µg/m^3) and therefore it is unlikely that there would be any significant air quality effects.

Further Mitigation

13.9.92 No significant effects for air quality are anticipated for the interim assessment year of 2032 as a result of the Project and therefore no further mitigation than the included in the Project is proposed.

Future Monitoring

13.9.93 Since no significant effects have been predicted for air quality in 2032, no further monitoring is proposed.

Significance of Effects

13.9.94 No further mitigation or monitoring, than the included in the Project, is required and therefore the effects would remain as not significant.

Design Year: 2038

13.9.1 As stated in paragraph 13.4.30 only aircraft emissions were calculated for this assessment scenario. By 2038 (design year of the Project) it is anticipated that there will be improvements in background air quality and vehicle emissions and therefore the 2032 assessment year represents the worst case for air quality. The 2038 design year has been assessed for the PEIR only in terms of aircraft emissions and not for road vehicle emissions. The aircraft emissions data from 2032 is included in the tables for completeness. As no road traffic emissions were calculated, there is no prediction of air quality concentrations included for this scenario. 2032 road traffic emission are included in the table for completeness.

Emissions Inventory

13.9.2 Table 13.9.5 presents the estimated annual emissions of NOx, PM_{10} and $PM_{2.5}$ for the design year of 2038 broken down by each pollution source. Total emissions for this scenario have been estimated to be 3,186 t/yr for NOx, 220 t/yr for PM_{10} and 134 t/yr for $PM_{2.5}$ with 2,260 t/yr (NOx), 46 t/yr (PM_{10}) and 31 t/yr for (PM_2) being related to the airport. The reported emissions for road vehicles (car parks and highway network) have been taken from the interim assessment year of 2032.

13.9.3 When compared to the 2038 future baseline scenario (ie without the Project) (Table 13.6.5), it can be observed that the Project would result in an increase in emissions for all sources and pollutants. This is due to increases in aircraft movements and associated activities on the airport. NOx emissions from aircraft are predicted to increase by 210.4 t/yr for aircraft in the air and 138.6t/yr for aircraft on the ground due to the Project in 2038.

13.9.4 Emissions of airport-related PM_{10} and $PM_{2.5}$ are predicted to increase by 6.0 t/yr and 4.1 t/yr respectively.

13.9.5 The design year with Project compared to the interim year with Project in 2032 (Table 13.9.4), sees decreases in the overall airport-related pollutant emissions of NOx, PM_{10} and $PM_{2.5}$. This is attributed to the improvements in technology associated with aircraft engines.

Table 13.9.5: Summary of Annual Pollutant Emissions of Aircraft Sources for the Design Year 2038

Source	NOx (t/yr)	PM_{10} (t/yr)	$PM_{2.5}$ (t/yr)
Aircraft in the air			
Approach	278.3	1.6	1.6
Initial climb	417.8	0.8	0.8
Climb out	534.0	1.3	1.3
Aircraft on the ground			
Landing	1.1	<0.1	<0.1
Reverse thrust	17.5	0.1	0.1
Taxiing	176.5	1.8	1.8
Hold	82.7	0.9	0.9
Take-off	493.4	1.1	1.1
Brake & tyre wear	N/A	8.4	4.3
APUs	83.5	1.9	1.9
Engine testing	0.8	<0.1	<0.1
Ground equipment			
GSE	9.6	1.6	0.8
Fixed plant			
Fire training ground	0.1	<0.1	<0.1
Energy plant	17.4	0.1	0.1

Source	NOx (t/yr)	PM_{10} (t/yr)	$PM_{2.5}$ (t/yr)
Car parks			
Car parks	2.2	0.2	0.2
Roads			
Airport	145.3	26.4	15.8
Non-airport	926.1	173.8	103.0
Total (all sources)	**3,186**	**220**	**134**
Total (airport-related)	**2,260**	**46**	**31**

13.10. Potential Changes to the Assessment as a Result of Climate Change

13.10.1 The potential changes to the air quality assessment as a result of climate change have been detailed in Chapter 15 and Appendix 15.9.2. The potential climate change hazards that could affect local air quality are an increase in the number of hot days and increased likelihood of extreme weather events. These could result in increased dust production during the construction phase or reduced availability of water for dust suppression measures due to extended dry periods of weather, changes in pollutant concentrations due to hot and dry weather conditions or changes in wind speed and direction, and changes in APU usage under extreme weather conditions. These changes are considered unlikely to change the significance of the predicted air quality effects.

13.11. Cumulative Effects

Zone of Influence

13.11.1 The zone of influence (ZoI) for air quality has been identified based on the spatial extent of likely effects.

Screening of Other Developments and Plans

13.11.2 The Cumulative Effects Assessment (CEA) takes into account the impact associated with the Project together with other developments and plans. The projects and plans selected as relevant to the CEA presented in this chapter are based upon the results of a screening exercise undertaken as part of the 'CEA short list' of developments (see Appendix 19.4.1). Each development on the CEA long list has been considered on a case by case basis for scoping in or out of this chapter's assessment based upon data confidence, effect-receptor pathways and the spatial/temporal scales involved.

13.11.3 In undertaking the CEA for the Project, it is important to bear in mind that the likelihood of other developments and plans being constructed varies depending on how far along the planning process they are. For example, relevant developments and plans that are already under construction are likely to contribute to a cumulative impact with the Project (providing impact or spatial pathways exist), whereas developments and plans not yet approved or not yet submitted are less certain to contribute to such an impact, as some may not achieve approval or may not ultimately be built due to other factors. For this reason, all relevant development and plans considered cumulatively alongside the Project have been allocated into 'Tiers', reflecting their

current stage within the planning and development process. Appropriate weight is therefore given to each Tier in the decision-making process when considering the potential cumulative impact associated with the Project, eg it may be considered that greater weight can be placed on the Tier 1 assessment relative to Tier 2. Further details of the screening process for the inclusion of other developments and plans in the short list and a description of the Tiers is provided in Chapter 19: Cumulative Effects and Inter-relationships.

13.11.4 The specific developments scoped into the CEA for air quality are detailed in Appendix 13.6.2 which shows the modelled receptors. Full details of each of the developments is provided in Appendix 19.4.1.

13.11.5 There are some developments within the 'CEA short list' which have not been included in the PEIR. Although this has not been considered at this stage of the assessment, there are existing human receptors which are located closer to the modelled local road network for which concentrations have been predicted, meaning that the worst case locations have been assessed.

Cumulative Effects Assessment

13.11.6 A description of the cumulative effects upon air quality receptors arising from each identified impact is given below.

13.11.7 As described in Chapter 12: Traffic and Transport, if Heathrow R3 was to come forward, traffic levels at Gatwick would likely decline in the period immediately following the opening of R3. However, by 2047, there would be little difference between demand at Gatwick with or without Heathrow R3 and accordingly this scenario would be unchanged irrespective of developments at Heathrow. The Heathrow R3 surface access narrative is predicated on "no more traffic", which is to say that total car traffic to the Airport is to be maintained at existing levels. GAL will, however, keep this under review and as it progresses its work and prepares its final documents, including the formal Environmental Statement in support of development consent.

Construction Phases: 2024 – 2029 and 2029 – 2032

13.11.8 Traffic data used in the assessment include known future developments and the assessment therefore incorporates cumulative impacts. The inputs into the ADMS model take into account all sources of pollution either as modelled sources or in the background concentrations. The CoCP and Construction Traffic Management Plan will include measures to account for cumulative impacts where these occur. No further cumulative effects, than those included in the assessment, are likely to occur in the construction phase 2024 to 2029 or 2029 to 2032 in terms of air quality.

First Full Year of Operation: 2029

13.11.9 Traffic data used in the assessment include known future developments and the assessment therefore incorporates cumulative impacts. The ADMS model takes into account all sources of pollution either as modelled sources or in the background concentrations. No further cumulative effects, than those included in the assessment, are likely to occur in the first full year of operation 2029 in terms of air quality.

Interim Assessment Year: 2032

13.11.10 Traffic data used in the assessment include known future developments and the assessment therefore incorporates cumulative impacts. The ADMS model takes into account all sources of pollution either as modelled sources or in the background concentrations. No further cumulative

effects, than those included in the assessment, are likely to occur in the interim assessment year 2032 in terms of air quality.

Design Year: 2038

13.11.11 No detailed assessment of road traffic emissions has been undertaken for the design year 2038. It is not anticipated that there would be any significant air quality effects from road traffic emissions in this scenario and therefore, no further cumulative effects, than those included in the assessment, are likely to occur in terms of air quality.

13.12. Inter-Related Effects

13.12.1 This chapter assesses the significance of potential effects on air quality. Potential effects on ecology, traffic, climate change, socio-economics and health are assessed in Chapters 9, 12, 15, 16 and 17, respectively.

13.12.2 Further details of inter-related effects are provided in Chapter 19: Cumulative Effects and Inter-relationships.

13.13. Summary

13.13.1 The assessment undertaken for the PEIR for construction and operation concludes that no significant air quality effects are predicted.

Next Steps

13.13.2 For the PEIR, pollutant concentrations have only been predicted at discrete sensitive human and ecological receptors. Contour mapping of pollutant concentrations will be undertaken, and the results will be presented in the ES.

13.13.3 Any changes to traffic data for the ES will be re-assessed and the modelled study area updated accordingly.

13.13.4 Any amendments to the methodology or data inputs that occur through further engagement with stakeholders will be incorporated into the ES.

13.13.5 It is not anticipated that any odorous materials will be excavated or used during the construction phase of the Project. A more detailed assessment of odour emissions during the construction phase will be provided in the ES should this be needed based on updated reports such as the contaminated land assessment.

Table 13.13.1: Summary of Effects

Receptor	Receptor Sensitivity	Description of Impact	Short/medium/long term/permanent	Magnitude of Impact	Significance of Effect	Significant/not significant	Notes
Construction Phases 2024 – 2029 and 2029 – 2032							
Human receptors and property	High	Dust deposition and increases in suspended particulate matter	Medium-term	N/A	Not significant	Not significant	With the dust control measures proposed in the CoCP, effects would not be significant
Human receptors	High	Increase in pollutant concentrations	Medium-term	Negligible	Not significant	Not significant	
Ecological receptors	Medium	Increases in pollutant concentrations and deposition rates	Medium-term	N/A	Not significant	Not significant	
First full year of operation 2029							
Human receptors	High	Increase in pollutant concentrations	Medium-term	Negligible	Not significant	Not significant	
Ecological receptors	Medium	Increases in pollutant concentrations and deposition rates	Medium-term	N/A	Not significant	Not significant	
Interim assessment year 2032							
Human receptors	High	Increase in pollutant concentrations	Medium-term	Negligible	Not significant	Not significant	

Receptor	Receptor Sensitivity	Description of Impact	Short/medium/long term/permanent	Magnitude of Impact	Significance of Effect	Significant/not significant	Notes
Ecological receptors	Medium	Increases in pollutant concentrations and deposition rates	Medium-term	N/A	Not significant	Not significant	
Design year 2038							
Human receptors	High	Increase in pollutant concentrations	Medium-term	N/A	N/A	N/A	Not assessed in detail for the PEIR
Ecological receptors	Medium	Increases in pollutant concentrations and deposition rates	Medium-term	N/A	N/A	N/A	Not assessed in detail for the PEIR

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Directive 2004/107/EC of the European Parliament and of the Council of 15 December 2004 relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air.

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13.15. Glossary

Table 13.15.1: Glossary of Terms

Term	Description
µg	Microgram
ADMS	Atmospheric Dispersion Modelling System
APF	Aviation Policy Framework
APIS	Air Pollution Information System
APU	Auxiliary Power Unit
AQAL	Air Quality Assessment Level
AQMA	Air Quality Management Area
AQS	Air Quality Strategy
ARN	Affected Road Network
ATM	Air Transport Movement
CAA	Civil Aviation Authority
CEA	Cumulative Effects Assessment
CoCP	Code of Construction Practice
Defra	Department of Environment, Food and Rural Affairs
DfT	Department for Transport
DMP	Dust Management Plan
EA	Environment Agency
EFT	Emissions Factors Toolkit
EIA	Environmental Impact Assessment
EPUK	Environmental Protection UK
ES	Environmental Statement
EU	European Union
FEGP	Fixed Electrical Ground Power
GAL	Gatwick Airport Limited
GIS	Geographical Information System
GSE	Ground Support Equipment
HGV	Heavy Goods Vehicle
HRA	Habitats Regulations Assessment
IAQM	Institute of Air Quality Management
ICAO	International Civil Aviation Organization
LNRs	Local Nature Reserves
LTO	Landing and Take-off
N deposition	Nitrogen deposition
NAEI	National Atmospheric Emissions Inventory
NHS	National Health Service
NNR	National Nature Reserve
NO_2	Nitrogen dioxide
NOx	Oxides of nitrogen

Term	Description
NPPF	National Planning Policy Framework
NPPG	National Planning Practice Guidance
NPS	National Policy Statement
O_3	Ozone
OS	Ordnance Survey
PC	Process Contribution
PEC	Predicted Environmental Concentration
PEIR	Preliminary Environmental Information Report
PM_{10} and $PM_{2.5}$	Particulate matter
SACs	Special Areas of Conservation
SATURN	Simulation and Assignment of Traffic to Urban Road Networks
SO_2	Sulphur dioxide
SPAs	Special Protection Areas
SPR	Source, Pathway, Receptor
SSSI	Site of Special Scientific Interest
TRA	Traffic Reliability Area
UFP	Ultrafine Particles
UK	United Kingdom
UNECE	United Nations Economic Commission for Europe
WHO	World Health Organisation
ZoI	Zone of Influence

Preliminary Environmental Information Report
Chapter 14: Noise and Vibration

September 2021

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14 Noise and Vibration

14.1. Introduction

14.1.1 This chapter of the Preliminary Environmental Information Report (PEIR) presents the findings of the Environmental Impact Assessment (EIA) work undertaken to date concerning the potential effects of the proposal to make best use of Gatwick's existing runways (referred to within this report as 'the Project') on the following types of noise:

- air noise – noise from aircraft in the air or departing or arriving (including reverse thrust) on a runway, generally assessed to a height up to 7,000 feet above ground level;
- ground noise – noise generated from airport activities at ground level including aircraft taxiing and traffic within the airport boundary;
- road traffic noise – noise from road traffic vehicles outside the airport on the public highway; and
- construction noise and vibration – noise and vibration from temporary construction of the Project, including the use of construction compounds.

14.1.2 In particular, this PEIR chapter:

- sets out the existing and future environmental baseline noise conditions, established from modelling carried out by the Civil Aviation Authority (CAA);
- presents the potential environmental effects on noise and vibration arising from the Project, based on the information gathered and the analysis and assessments undertaken to date;
- identifies any assumptions and limitations encountered in compiling the environmental information; and
- highlights mitigation measures that are proposed to minimise the likely environmental effects identified in the EIA process.

14.1.3 The noise and vibration assessment considers the likely significant effects arising from the construction and operation of the Project on:

- people, primarily where they live ('residential receptors') on an individual dwelling basis and on a community basis, including any shared community open areas;
- community facilities such as schools, hospitals, places of worship; and
- commercial properties such as offices and hotels, collectively described as 'non-residential receptors'.

14.1.4 Air noise has the potential to affect residents, and other Noise Sensitive Receptors (NSRs) over a wide area beyond the airport boundary. This chapter reports the results of modelled changes in noise that can be expected over this area. It uses a number of noise metrics to quantify the changes in noise that are expected following established guidance, and also provides additional detail on the changes that are expected at representative communities.

14.1.5 This chapter is accompanied by Appendices 14.9.1 to 14.9.5 and a set of figures. A glossary of acoustics terminology is provided in Section 14.15.

14.1.6 The PEIR will inform pre-application consultation. Following consultation, comments on the PEIR will be reviewed and taken into account in preparation of the Environmental Statement (ES) that will accompany the application to the Planning Inspectorate for development consent.

14.2. Legislation and Policy

Legislation

14.2.1 This section provides an overview of the legislation relevant to the assessment of noise and vibration.

Land Compensation Act 1973

14.2.2 This Act provides for depreciation in property price caused by noise as a physical factor from public works (highway or aerodrome) to be compensated by the responsible authority. Compensation is payable where the noise either arises from activity on land taken (injurious affection) (Part II of the Act) or is physically unconnected to the land interest (Part 1 claims). It also provides powers to enable the sound-proofing of (noise insulate) buildings from noise from highways and aerodromes and the payment of expenses of persons moving temporarily during construction works (due to noise).

Control of Pollution Act 1974

14.2.3 The Control of Pollution Act 1974 provides the definition of Best Practicable Means (BPM) to minimise noise (including vibration). Section 60 of the Act deals with the control of noise on construction sites and for the circumstances where a local authority may serve a notice on the person carrying out the works to undertake them in accordance with particular conditions. When considering the conditions, the local authority is to have regard to the BPM available to minimise noise. Section 61 of the Act allows the person carrying out construction works to seek prior consent by adopting BPM – effectively providing a defence against a Section 60 notice. The Act also provides the basis for defining codes of practice (eg BS 5228: 2014 Code of practice for noise and vibration control on construction and open sites, Part 1: Noise and Part 2: Vibration (BSI, 2014a, b)).

Environmental Protection Act 1990

14.2.4 The Environmental Protection Act 1990 sets out duties for local authorities to investigate and, where identified, take abatement action against noise nuisance. The Act provides the definition of BPM to minimise noise (including vibration), the basis for defence against noise abatement action taken by a local authority (Section 80). The Act additionally provides for individuals to pursue abatement action to be taken by a magistrate's court against noise nuisance (Section 82).

Civil Aviation Act 1982 and 2012

14.2.5 The Civil Aviation Act 1982 provides that no action for trespass or nuisance can be taken as long as an aircraft observes the provisions of any Air Navigation Order. It also grants the Government powers to introduce noise control measures at designated airports (Gatwick is a designated airport), for example night restrictions.

14.2.6 The Civil Aviation Act 2012 was introduced to modernise the regulatory framework for civil aviation in the United Kingdom. It sets out the legislative framework for the economic regulation of airports and the CAA and confers certain aviation security functions on the CAA.

The Environmental Noise (England) Regulations 2006

14.2.7 These regulations implement the EU Environmental Noise Directive (END) 2002/49/EC relating to the assessment and management of environmental noise. The regulations set out the requirement to undertake strategic noise mapping and implement Noise Action Plans on a five year basis, for agglomerations and major roads, railways and airports. Gatwick Airport produced its latest Noise Action Plan in 2019 covering the period 2019-2024 (Gatwick Airport Limited (GAL), 2019).

Regulation (EU) No 598/2014

14.2.8 Regulation (EU) No 598/2014 relates to the establishment of rules and procedures with regard to the introduction of noise-related operating restrictions at European Union airports within a 'balanced approach'. Following the departure of the UK from the European Union, Regulation (EU) No 598/2014 was adopted into UK law on 15 January 2021.

14.2.9 The aim of EU 598/2014 is to ensure that the International Civil Aviation Organization (ICAO) balanced approach (ICAO, 2008) is adopted for aircraft noise management at airports where a noise problem has been identified. Regulation EU 598/2014 requires a range of noise mitigation measures to be considered in accordance with the balanced approach, with a view to determining the most effective measure or combination of measures. The balanced approach consists of four main elements:

- noise at source;
- land use planning;
- operating procedures; and
- operating restrictions.

14.2.10 Regulation EU 598/2014 seeks to ensure that 'noise related operating restrictions' are only imposed when other measures within the balanced approach have first been considered, and where those other measures are not in themselves sufficient to attain the specific noise abatement objectives for the airport. Following this, if a noise based operating restriction is considered necessary, it can only be imposed after the 'cost effectiveness' of the restriction has been considered and if the measures together are no more than is necessary to achieve the environmental noise abatement objectives set for the airport. Appendix 14.9.2 gives further details.

Noise Insulation Regulations 1975

14.2.11 The Noise Insulation Regulations 1975 (as amended) apply to 'new' or 'altered' roads, and make provisions to carry out or give grants for noise insulation. Traffic noise changes on unaltered roads are not subject to the regulations. They also provide discretionary powers to provide noise insulation or temporary rehousing for construction of new or altered roads.

Planning Policy Context

National Policy Statements

14.2.12 The Airports National Policy Statement (NPS) (Department for Transport, 2018a), although primarily provided in relation to a new runway at Heathrow Airport, remains a relevant consideration for other applications for airport infrastructure in London and the south east of England.

14.2.13 The NPS for National Networks (Department for Transport, 2015)[1] sets out the need for development of road, rail and strategic rail freight interchange projects on the national networks and the policy against which decisions on major road and rail projects will be made. Table 14.2.1 provides a summary of the relevant requirements of these NPSs and how these are addressed within the PEIR.

Table 14.2.1: Summary of NPS Information Relevant to this Chapter

Summary of NPS requirement	How and where considered in the PEIR
Airports NPS	
Paragraph 5.67 states that *'The proposed development must be undertaken in accordance with statutory obligations for noise. Due regard must have been given to national policy on aviation noise, and the relevant sections of the Noise Policy Statement for England (NPSE), the National Planning Policy Framework (NPPF) and the Government's associated planning guidance on noise.'*	The noise assessment has had due regard to noise guidance within the NPSE and the NPPF, as discussed in the section below this table.
Paragraph 5.68 states that *'Development consent should not be granted unless the Secretary of State is satisfied that the proposals will meet the following aims for the effective management and control of noise, within the context of Government policy on sustainable development:* ▪ Avoid significant adverse impacts on health and quality of life from noise; ▪ Mitigate and minimise adverse impacts on health and quality of life from noise; and ▪ Where possible, contribute to improvements to health and quality of life.'	The noise assessment has had due regard to guidance as it echoes the NPSE. Mitigation measures have been developed to avoid significant adverse effects (eg noise insulation schemes). A wide range of mitigation measures will be used to minimise adverse effects and in accordance with the third objective, opportunities have been taken to reduce road traffic noise when designing the highway improvements. (see Section 14.8 and Appendix 14.9.2).
Paragraph 5.5.2 states *'Pursuant to the terms of the Environmental Impact Assessment Regulations, the applicant should undertake a noise assessment for any period of change in air traffic movements prior to opening, for the time of opening, and at the time the airport is forecast to reach full capacity, and (if applicable, being different to either of the other assessment periods) at a point when the airport's noise impact is forecast to be highest. This should form part of the environmental statement. The noise assessment should include the following:* ▪ A description of the noise sources;	The air traffic scenarios modelled are in accordance with this guidance (see Section 14.7). Table 14.7.1 lists the maximum design parameters and is followed by an explanation of the worst case noise assessment. The NSRs listed are all assessed. National Parks and Areas of Outstanding Natural Beauty (AONBs)

[1] It is noted that the Transport Decarbonisation Plan published by Department for Transport (DfT) on 14 July 2021 announced DfT's intention to review the NPS for National Networks in due course once demand patterns post-pandemic become clearer. It is understood DfT intends to commence the review by the end of 2021 and complete it by Spring 2023. In the interim and whilst the review is undertaken, DfT has confirmed the NPS for National Networks remains relevant government policy and has full force and effect for the purposes of the Planning Act 2008.

Summary of NPS requirement	How and where considered in the PEIR
▪ An assessment of the likely significant effect of predicted changes in the noise environment on any noise sensitive premises (including schools and hospitals) and noise sensitive areas (including National Parks and Areas of Outstanding Natural Beauty); ▪ The characteristics of the existing noise environment, including noise from aircraft, using noise exposure maps, and from surface transport and ground operations associated with the DCO project, the latter during both the construction and operational phases of the DCO project; ▪ A prediction on how the noise environment will change with the proposed DCO project; and ▪ Measures to be employed in mitigating the effects of noise. *These should take into account construction and operational noise (including from surface access arrangements) and aircraft noise. The applicant's assessment of aircraft noise should be undertaken in accordance with the developing indicative airspace design. This may involve the use of appropriate design parameters and scenarios based on indicative flightpaths.'*	are assessed in Chapter 8: Landscape, Townscape and Visual Resources. Road traffic noise is assessed within this chapter and mitigation is recommended where appropriate. Construction noise is assessed in this chapter and mitigation is recommended where appropriate. Whilst the development of a third runway at Heathrow is contingent on major revisions to airspace in the south east of England, this Project is not. As such, the noise assessment is based on the flight paths required for the Project which are the flight paths currently flown.
Paragraph 5.53 first *states 'Operational noise, with respect to human receptors, should be assessed using the principles of the relevant British Standards and other guidance. For the prediction, assessment and management of construction noise, reference should be made to any British Standards and other guidance which give examples of mitigation strategies.'*	The assessment draws on various British Standards including BS 5228 (BSI, 2014a, b) for construction noise as described in Section 14.4.
Paragraph 5.53 goes on to state *'In assessing the likely significant impacts of aircraft noise, the applicant should have regard to the noise assessment principles, including noise metrics, set out in the national policy on airspace.'*	The assessment of aircraft noise follows guidance for airspace change, see Section 14.4.
Para 5.52 states *'The applicant's assessment of aircraft noise should be undertaken in accordance with the developing indicative airspace design. This may involve the use of appropriate design parameters and scenarios based on indicative flightpaths'*. The Airports NPS further notes that: *'Precise flight path designs can only be defined at a later stage after detailed airspace design work has taken place. Once the design work has been completed, the airspace proposal will be subject to extensive consultation as part of the separate airspace decision making process established by the Civil Aviation Authority.'* (para 5.50).	Whilst the development of a third runway at Heathrow is contingent on major revisions to airspace in the south east of England, this Project is not. As such, the noise assessment is based on the flight paths required for the Project which are the flight paths currently flown.

Summary of NPS requirement	How and where considered in the PEIR
The Airports NPS also states that *'The noise mitigation measures should ensure the impact of aircraft noise is limited and, where possible, reduced compared to the 2013 baseline assessed by the Airports Commission.'* (para 5.58).	Reference is made to the 2013 baseline in the assessment of effects in Section 14.9.
Paragraphs 5.54-5.66 set out requirements relating to noise mitigation.	Mitigation measures included as part of the design of the Project are presented in Section 14.8.
NPS for National Networks	
In accordance with paragraph 4.7 of the Airports NPS, the NPS for National Networks is also relevant to surface access elements of the project. Of particular relevance to the assessment of road traffic noise is paragraph 5.189, which states: *'Where a development is subject to EIA and significant noise impacts are likely to arise from the proposed development, the applicant should include the following in the noise assessment, which should form part of the environment statement:* ▪ A description of the noise sources including likely usage in terms of number of movements, fleet mix and diurnal pattern. For any associated fixed structures, such as ventilation fans for tunnels, information about the noise sources including the identification of any distinctive tonal, impulsive or low frequency characteristics of the noise; ▪ Identification of noise sensitive premises and noise sensitive areas that may be affected; ▪ The characteristics of the existing noise environment; ▪ A prediction on how the noise environment will change with the proposed development; - In the shorter term such as during the construction period; - In the longer term during the operating life of the infrastructure; - At particular times of the day, evening and night as appropriate; ▪ An assessment of the effect of predicted changes in the noise environment on any noise sensitive premises and noise sensitive areas; ▪ Measures to be employed in mitigating the effects of noise; ▪ Applicants should consider using best available techniques to reduce noise impacts; and ▪ The nature and extent of the noise assessment should be proportionate to the likely noise impact.'	The traffic noise assessment meets these requirements (see Section 14.9). Impacts at night will be reported in the Environmental Statement.

National Planning Policy Framework, 2021

14.2.14 The National Planning Policy Framework (NPPF) (Ministry of Housing, Communities and Local Government, 2021) provides the Government's policies to promote sustainable development and sets out that the purpose of the planning system is to contribute to the achievement of sustainable development. Sustainable development includes three dimensions: economic, social and environmental, and thus, when planning decisions are made, the process requires weighing the relative balance of these three factors.

14.2.15 The NPPF at paragraph 185 states the following, referring to the NPSE for further explanation:

'Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life[2];

b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; and

c) limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.'

Noise Policy Statement for England (NPSE), 2010

14.2.16 In 2010, the NPSE (Defra, 2010) set out the long-term vision of the Government's noise policy to: *'Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development'.*

14.2.17 The aims of the policy are: *'Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:*

1. Avoid significant adverse impacts on health and quality of life.

2. Mitigate and minimise adverse impacts on health and quality of life.

3. Where possible, contribute to the improvement of health and quality of life.'

14.2.18 To identify "*significant adverse*" and "*adverse*" impacts in line with the three aims of NPSE, the policy statement notes that there are two established concepts from toxicology that are currently being applied to noise impacts, for example, by the World Health Organization (WHO). They are:

[2] See Explanatory Note to the Noise Policy Statement for England (Department for Environment, Food & Rural Affairs (Defra), 2010).

- NOEL – No Observed Effect Level: this is the level below which no effect can be detected. In simple terms, below this level there is no detectable effect on health and quality of life due to the noise.
- LOAEL – Lowest Observed Adverse Effect Level: this is the level above which adverse effects on health and quality of life can be detected.

14.2.19 Extending these concepts for the purpose of the NPSE leads to the concept of a significant observed adverse effect level.

- SOAEL – Significant Observed Adverse Effect Level: this is the level above which significant adverse effects on health and quality of life occur.

14.2.20 The policy states: *'The second aim of the NPSE refers to the situation where the impact lies somewhere between LOAEL and SOAEL. It requires that all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development (paragraph 1.8). This does not mean that such adverse effects cannot occur.'*

14.2.21 The NPSE notes that: *'it is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available'*.

Aviation Policy Framework, 2013

14.2.22 In 2013, the Aviation Policy Framework (Department for Transport, 2013) set out the framework for the management of noise at UK airports. It noted the role of the Government to set the overall national policy framework for aviation noise, and to use its powers under the Civil Aviation Act 1982 (as amended) to set noise controls at specific airports which it designates for noise management purposes (which includes Gatwick).

14.2.23 The Aviation Policy Framework notes that the Government fully recognises the ICAO Assembly 'balanced approach' principle to aircraft noise management. In addition, the overall aviation noise policy objective is summarised as:

'to limit and, where possible, reduce the number of people in the UK significantly affected by aircraft noise, as part of a policy of sharing benefits of noise reduction with industry.'

14.2.24 This is consistent with the Government's noise policy, as set out in the NPSE.

Consultation Response on UK Airspace Policy: A Framework for Balanced Decisions on the Design and Use of Airspace, October 2017

14.2.25 In February 2017, the Department for Transport launched a consultation on airspace policy (Department for Transport, 2017a). The response to consultation was published in October 2017 (Department for Transport, 2017b) and reiterated the overall policy objective given in the Aviation Policy Framework, adding to it as follows:

'The government's overall policy on aviation noise is to limit and, where possible, reduce the number of people in the UK significantly affected by aircraft noise, as part of a policy of sharing benefits of noise reduction between industry and communities in support of sustainable development.'

14.2.26 Following the Survey of Noise Attitudes (SONA) report (Civil Aviation Authority, 2014), the consultation response was able to give further guidance on LOAELs for aircraft noise as follows:

- 'The government acknowledges the evidence from recent research which shows that sensitivity to aircraft noise has increased, with the same percentage of people reporting to be highly annoyed at a level of 54 dB $L_{Aeq,\ 16\ hour}$ as occurred at 57 dB $L_{Aeq,\ 16\ hour}$ in the past. The research also showed that some adverse effects of annoyance can be seen to occur down to 51 dB L_{Aeq}.
- Taking account of this and other evidence on the link between exposure to noise from all sources and chronic health outcomes, we will adopt the risk based approach proposed in our consultation so that airspace decisions are made in line with the latest evidence and consistent with current guidance from the World Health Organization.
- So that the potential adverse effects of an airspace change can be properly assessed, for the purpose of informing decisions on airspace design and use, we will set a LOAEL at 51 dB $L_{Aeq,\ 16\ hour}$ for daytime, and based on feedback and further discussion with CAA we are making one minor change to the LOAEL night metric to be 45 dB $L_{Aeq,\ 8\ hour}$ rather than L_{night} to be consistent with the daytime metric. These metrics will ensure that the total adverse effects on people can be assessed and airspace options compared. They will also ensure airspace decisions are consistent with the objectives of the overall policy to avoid significant adverse impacts and minimise adverse impacts.'

14.2.27 Thus, the LOAELs for aircraft noise had been established as 51 dB $L_{Aeq\ 16\ hour}$ for daytime, and 45 dB $L_{Aeq,\ 8\ hour}$ for night-time.

14.2.28 The Government recognises that a small number of people may be annoyed below the LOAEL and sets out in the consultation that it would consider which additional metrics be used to inform on effects:

'5.43 As explained above, a small number of people may consider themselves adversely affected by aircraft noise at levels below the LOAEL. Reactions to recent airspace changes and trials have clearly indicated that increases in the number of aircraft that people are exposed to can be noticeable and can annoy individuals, even at a noise exposure below 51 dB $L_{Aeq,\ 16\ hour}$. We have therefore considered which additional metrics for assessing aviation noise could be included in our guidance.'

14.2.29 Subsequently in 2018, CAP 1616 *Airspace Design: Guidance on the Regulatory Process for Changing Airspace, Design including Community Engagement Requirements* was published and provides the methodology for assessing the noise effects of an airspace change using L_{eq} and WebTAG to quantify significant effects. The document was updated in 2021 (CAA, 2021). It defines a series of "secondary noise metrics" to assess adverse effects of noise including: number above contours, L_{max} contours, difference contours, and overflight contours (not a noise metric, but a secondary metric for the purposes of decision making). These are discussed in Section 14.4.

14.2.30 The consultation response also confirms the following from the Aviation Policy Framework:

- the Government continues to expect airport operators to offer assistance with the costs of moving households exposed to levels of noise of 69 dB $L_{Aeq, 16\ hour}$ or more;
- the Government also expects airport operators to offer acoustic insulation to noise sensitive buildings, such as schools and hospitals, exposed to levels of noise of 63 dB $L_{Aeq, 16\ hour}$ or more; and
- as a minimum, the Government would expect airport operators to offer financial assistance towards acoustic insulation to residential properties which experience an increase in noise of 3 dB or more which leaves them exposed to levels of noise of 63 dB $L_{Aeq, 16\ hour}$ or more.

Aviation 2050: The Future of UK Aviation, A Consultation, December 2018

14.2.31 The consultation period for Aviation 2050 closed in June 2019. The submitted consultation document (Department for Transport, 2018b) indicates the Government's views in developing the Aviation Strategy and seeks views on these. In paragraph 3.114, it acknowledges that noise may decrease or may increase:

'The government intends to put in place a stronger and clearer framework which addresses the weaknesses in current policy and ensures industry is sufficiently incentivised to reduce noise, or to put mitigation measures in place where reductions are not possible'.

14.2.32 The consultation goes on to discuss various proposed measures including setting noise caps as part of planning applications, lower noise levels and better standards for noise insulation, and the future role of the Independent Commission on Civil Aviation Noise to assist in enforcement etc. Section 14.8 discusses the proposed lower noise levels and how these have been adopted as a mitigation standard for this Project. The Aviation Strategy was due to be released at the end of 2019. It is likely that these proposals will be clarified as the Project progresses, in which case the assessment of air noise impacts from the Project will take account of the policy guidance at the time.

Independent Commission on Civil Aviation Noise (ICCAN)

14.2.33 The Independent Commission on Civil Aviation Noise (ICCAN) is a non-statutory advisory body, established in 2019 to act as the impartial expert adviser to Government and others on all matters relating to aviation noise. ICCAN published its first Corporate Strategy in Spring 2019 and in March 2021 published a new Corporate Strategy for 2021-2024 (ICCAN, 2021a). In its first two years ICCAN has consulted widely with stakeholders and commissioned a number of studies to help inform better noise management including:

- a summary of aviation noise's health effects (ICCAN, 2020a);
- a survey of people's experience of aviation noise during lockdown (ICCAN, 2020b);
- the future of aviation noise management ICCAN's emerging view (ICCAN, 2020c);
- best practice for engagement between airports and communities on aviation noise (ICCAN, 2020d); and
- a review of airport noise insulation schemes (ICCAN, 2021b).

14.2.34 ICCAN's Corporate Strategy proposes a varied work plan producing guidelines, supporting research, offering advice etc. It also proposes that ICCAN is given *statutory adviser* status within the next five years, with the power to:

- make recommendations to Government on the management and mitigation of aviation noise; and
- provide advice and guidance that must be considered by the Government, devolved administrations and delegated authorities on all aviation noise related issues. This could take the form of standardised, national guidance for airports and others to follow on a range of key issues, or it could be bespoke, ad hoc advice for stakeholders to consider on local challenges.

14.2.35 ICCAN has also recommended that it is becomes a statutory consultee on planning applications and airspace change proposals. The DfT is currently carrying out a review of ICCAN's performance. The Corporate Strategy assumes that statutory powers will not be granted within the next three years, and so lays out a work plan that is not dependent on those powers.

14.2.36 GAL has engaged with ICCAN since its formation, publicly through the Noise Management Board, and through regular direct communications. GAL would welcome ICCAN's views on the Northern Runway Project, in particular on the noise mitigation measures described in Section 14.8 which have been developed taking account of ICCAN's work to date.

WHO Environmental Noise Guidelines for the European Region

14.2.37 In October 2018, the WHO published its Environmental Noise Guidelines for the European Region (WHO, 2018). These guidelines cover external noise levels for specific noise sources, not mixed sources. The majority of people experiencing aircraft noise also experience other sources of noise, generally road traffic.

14.2.38 The WHO Community Noise Guidelines (WHO, 1999) general recommendations on non-specific noise and internal noise levels remain relevant. The 2018 Environmental Noise Guidelines use the same standardised EU noise metrics L_{den} (an annual average day, evening, night weighted L_{eq} level) and L_{night} (the annual average 8 hour night L_{eq}). Similarly, the guidance in the WHO Night Noise Guidelines (WHO, 2009) using other metrics is not superseded.

14.2.39 The 2018 Environmental Noise Guidelines are based on a detailed review of the literature from 1999 to 2015. In the case of aircraft noise, the scatter in the dose/response relationships is considerable, but a single dose response is offered for each health effect with associated target levels for aircraft noise in terms of the European annual average noise metrics L_{den} and L_{night}. However, in Section 5, Implementation of the Guidelines, the WHO note:

'Furthermore, cultural differences in what is considered annoying are significant, even within Europe. Therefore, it is not possible to determine the "exact value" of % HA [highly annoyed] for each exposure level in any generalized situation. Instead, data and exposure-response curves derived in a local context should be applied whenever possible to assess the specific relationship between noise and annoyance in a given particular situation.'

14.2.40 The SONA study assessed annoyance in the UK and reported in 2017, after the cut-off date for studies considered in the WHO report. The SONA study gives the local annoyance response relationship relevant to the UK. It shows, in the UK, about 7% of the population in 2014 was annoyed by aircraft noise at $L_{eq,\ 16\ hour}$ 51 dB, and the Department for Transport has adopted this as the LOAEL.

Recent Planning Cases and SOAEL

14.2.41 Government guidance, as summarised above, does not explicitly define SOAEL for aviation noise. However, a number of recent applications for airport development have considered this to ensure suitable mitigation is included to comply with the NPSE and NPPF requirement to 'avoid' significant adverse effects.

14.2.42 Since 2014 noise policy has been interpreted by, variously, the local planning authorities, public inquiry inspectors, the Mayor of London and the Secretary of State for Transport, in the following applications for new airport infrastructure:

- Birmingham International Airport Runway Extension, 2014;
- London City Airport Development Plan, 2015-2016;
- Cranford Agreement Secretary of State's Decision, February 2017 (DCLG, 2017);
- Stansted Airport Planning Appeal Decision, May 2021

14.2.43 In the Cranford case, the inspector noted *'the parties do not differ about the SOAEL for aircraft noise: it is 63dB $L_{Aeq,\ 16\ hour}$ (or its equivalent if other metrics are considered). Noise impacts at that level require to be avoided.'*

14.2.44 These planning decisions have been considered when developing the assessment criteria described in Section 14.4.

Local Planning Policy

14.2.45 Gatwick Airport lies within the administrative area of Crawley Borough Council and adjacent to the boundaries of Mole Valley District Council to the north west, Reigate and Banstead Borough Council to the north east and Horsham District Council to the south west. The administrative area of Tandridge District Council is located approximately 1.9 km to the east of Gatwick Airport, while Mid Sussex District Council lies approximately 2 km to the south east. Gatwick Airport is located in the county of West Sussex and immediately adjacent to the bordering county of Surrey.

14.2.46 The relevant local planning policies applicable to noise based on the extent of the study area for this assessment are summarised in Table 14.2.2.

Table 14.2.2: Local Planning Policy

Administrative Area	Plan	Policy
Adopted Policy		
Crawley	Crawley 2030: Crawley Borough Local Plan 2015-2030 (2015)	GAT1 Development of the Airport with a Single Runway
		ENV11 Development & Noise, and the Local Plan Noise Annex
Reigate and Banstead	Reigate and Banstead Local Plan: Core Strategy (2014)	CS10 Sustainable Development
		DES8 Construction Management

Administrative Area	Plan	Policy
	Reigate and Banstead Local Plan Development Management Plan (2019)	DES9 Pollution & Contaminated Land
Mole Valley	Mole Valley Core Strategy (2009)	CS 19 Sustainable Construction, Renewable Energy & Energy Conservation
	Mole Valley Local Plan (2000) (saved policies)	ENV22 General Development Control Criteria
Horsham	Horsham District Planning Framework (2015)	Policy 24 Environmental Protection
Tandridge	Tandridge District Core Strategy (2008)	CSP 16 Aviation Development
		CSP 18 Character & Design
	Tandridge Local Plan Part 2: Detailed Policies 2014-2029 (2014)	DP22 Minimising Contamination, Hazards & Pollution
Mid Sussex	Mid Sussex District Plan 2014-2031 (2018)	DP29 Noise, Air & Light Pollution
	Mid Sussex District Local Plan 2004 (saved policies)	B23: Noise Pollution
		CS22: Pollution
Emerging Policy		
Crawley	Draft Crawley Borough Local Plan 2021-2037 (2021)	SD1: Presumption in Favour of Sustainable Development
		EP4: Development and Noise and Local Plan Noise Annex (topic Paper 7)
		GAT2: Safeguarded Land
Tandridge	Our Local Plan 2033 (Regulation 22 Submission) (2019)	TLP45 Energy Efficient & Low Carbon Development
		TLP46 Pollution and Air Quality
Mole Valley	Future Mole Valley, 2018-2033, Consultation Draft Local Plan (2020)	Policy EN13: Promoting Environmental Quality
Horsham	Draft Horsham District Local Plan 2019-2036 (2020)	Policy 25 - Strategic Policy: Environmental Protection

14.3. Consultation and Engagement

14.3.1 In September 2019, GAL submitted a Scoping Report to the Planning Inspectorate. This described the scope and methodology for the technical studies being undertaken to provide an assessment of any likely significant effects and, where necessary, to determine suitable mitigation measures for the construction and operational phases of the Project. It also described those topics or sub-topics which are proposed to be scoped out of the EIA process and provided

justification as to why the Project would not have the potential to give rise to significant environmental effects in these areas.

14.3.2 Following consultation with the statutory bodies, the Planning Inspectorate (on behalf of the Secretary of State) provided a Scoping Opinion on 11 October 2019.

14.3.3 Key issues raised during the scoping process specific to the noise and vibration chapter are listed in Table 14.3.1 together with details of how these issues have been addressed within the PEIR.

Table 14.3.1: Summary of Scoping Responses

Details	How/where addressed in PEIR
Planning Inspectorate	
The Scoping Report attests that the "study area for noise and vibration effects…cannot be determined until noise levels resulting from the Project have been modelled". Therefore, the Inspectorate cannot agree that impacts to 'Quiet Areas' (as designated within Local Plans or Neighbourhood Development Plans or areas identified as Quiet Areas through the Environmental Noise (England) Regulations 2006)) can be scoped out of the ES. The assessment should assess impacts on these areas, where significant effects are likely to occur.	No designated Quiet Areas within the areas modelled have been identified. Overflights of areas valued for their landscape have been quantified for use in the landscape and visual impact assessment. See Sections 14.9 and 14.11.17.
The Applicant seeks to scope out consideration of APUs on the basis that previous ground noise studies and operational reports demonstrate that the need for APUs is rare (as ground power is generally available) and that the sound power of a taxiing jet aircraft exceeds that of an APU such that increases to the overall sound power (when APU noise is combined) are 'inconsequential'. The Inspectorate does not consider that the Applicant has provided sufficient information to justify scoping this matter out. The ES should assess impacts associated with noise from APUs where significant effects are likely to occur.	Noise from aircraft auxiliary power units (APUs) has been scoped into the assessment and is considered within Section 14.9.
The Scoping Report contains limited information with regards to potential sources of construction or operational vibration and the Inspectorate is therefore unable to scope this matter out. The ES should include an assessment of operational vibration, where likely significant effects could occur.	Given the separation of the construction worksites from neighbouring sensitive receptors, significant vibration effects from construction are generally unlikely. However, this conclusion regarding vibration from construction plant and construction traffic will be tested in the ES. In accordance with the May 2020 DMRB guidance (LA111) vibration during operation of the highway is not likely and can be scoped out. LA111 states that:

Details	How/where addressed in PEIR
	'*Operational vibration is scoped out of the assessment methodology as a maintained road surface will be free of irregularities as part of project design and under general maintenance, so operational vibration will not have the potential to lead to significant adverse effects'*. Ground vibration from sources within the airport are highly unlikely to be significant at receptors off site.
The Scoping Report provides very little information on the type and nature of road traffic and the junction designs necessary to support the statement that "vibration from operational road traffic…is expected to be below the scoping thresholds". Accordingly, the Inspectorate does not agree to scope this matter out. The Inspectorate considers that an assessment of vibration effects arising from construction vehicles on the existing road network should be provided as part of the ES, in line with the methodological approach established in the Design Manual for Roads and Bridges (DMRB). It is unclear whether the Applicant also proposes to scope out vibration from construction traffic, but for the avoidance of doubt, the Inspectorate's comments above apply equally in the context of construction traffic (noting the additional relevance of BS:5228 'Code of practice for noise and vibration control on construction and open sites' in this regard).	Vibration from construction plant and construction traffic is unlikely to give rise to significant effects. However, this conclusion will be tested further in the ES. As discussed above, in accordance with the May 2020 DMRB guidance vibration during operation of the highway can be scoped out.
The assessment should provide a clear description to distinguish between where "air noise" and "ground noise" begin and end. The description should have regards to the activities such as landing and taxiing planes. For example, once a plane lands and is off the runway, at what point does it become part of the "ground noise". Particular consideration will also need to be given to the provisions of the 'end around' taxiways and new holding spurs in this regard as they bring taxiing aircraft closer to existing sensitive receptors. The ground noise assessment should also be clear as to how other 'key components' of the project have been factored in (including substations, heating plant, engine testing and the north and south terminal extensions) in terms of any additional contributions over aircraft ground noise at sensitive receptors.	The distinction between air, ground, road and construction noise has been clarified (see Section 14.1). Ground noise includes all taxiway noise, including end around taxiways. Noise from engine testing has been assessed (see Section 14.9). Significant noise effects from the operation of substations, heating plant and other permanent fixed noise sources are not expected but will be assessed in the ES.
The Applicant explains that the project does require the routings of aircraft "close to the airport" to be changed, which would appear to contradict the later assertion that "any noise impacts of the Project	As further explained in Section 14.8 and Appendix 14.9.2, aircraft using the

Details	How/where addressed in PEIR
will be the result of increases in noise due to the increased number of flights on the northern runway, rather than new noise impacts over areas previously unaffected". The ES should assess the likely significant effects associated with these changes and assess effects on additional affected noise receptors. The ES should also assess the extent to which the Proposed Development would result in an increased capacity on the main runway (potentially) allowing for additional movements by larger, nosier aircraft which could generate further increases in noise on the main runway compared to current operation. The baseline and future baseline assumptions in terms of usage of the northern runway should also be clearly set out so as to understand the number of additional movements being modelled in predicting significance of effect.	altered northern runway would use the same flight paths as currently flown from the existing northern runway but displaced some 12 metres further to the north (equating to about a third of a wingspan of the average sized aircraft). The main and northern runway flight paths run parallel to each other maintaining the track of the respective extended runway centrelines. At the point that aircraft begin to turn to the north or south (between 5 and 16 km from the runway) the main and northern runway flight paths merge. Flights from both runways are included in the assessment, and the forecast allows for growth in operations of larger aircraft from the main runway. The numbers of movements are set out in the Table 14.7.1 in Section 14.7.
The Airports NPS states that the assessment of aircraft noise should be undertaken in accordance with the developing indicative airspace design, which may involve the use of appropriate design parameters and scenarios based on indicative flight paths. The ES should ensure that it presents an assessment of the realistic worse-case scenarios for the Proposed Development, including consideration of any airspace change implications for the noise assessment and the introduction of performance-based navigation. The assumed Air Traffic Movements (ATM) should be clearly stated for all assessment scenarios. Furthermore, a WebTAG analysis to value and compare the noise impact of these options should be provided consistent with the requirements of the Air Navigation Guidance 2017 (as cited by the Applicant at 7.14.7 of the Scoping Report). When considering the introduction of quieter aircraft each year against growth in ATMs, the ES should clearly identify the worst case scenarios in terms of noise effects (against CAA's latest estimates as set out at paragraph 7.8.30 of the Scoping Report).	Whilst the development of a third runway at Heathrow is contingent on major revisions to airspace in the south east of England, this Project is not. It is not currently possible to consider in detail the airspace change that will be required for a third runway at Heathrow because the design of that airspace is being developed separately to a different programme. As such, the noise assessment is based in the flight paths required for the Project which are the flight paths currently flown. As above, air traffic forecasts are provided in Section 14.7. Appendix 14.9.2 provides the WebTAG assessment. The ATM forecasts used for the modelling of noise in the future are based on estimates of how the fleet will transition based on assumptions around airlines' fleet procurement programmes and business models. The 'central case' used in the noise assessment is based on what

Details	How/where addressed in PEIR
	is considered today to be the most likely rate of fleet transition. However, there is uncertainty around this, particularly at the current time due to the global pandemic and the financial impact on the airlines. Therefore, noise modelling has also been carried out for a 'slower transition fleet' based on ATM forecasts in which the rate of fleet transition is delayed by about five years and which would result in higher noise levels than the central case. A sensitivity analysis was carried out that concluded 2032 would be the year of greatest noise impacts, as explained in Section 14.7.
The Applicant explains that the baseline for the air noise assessment will be the 2018 summer season. There is also reference to Gatwick Airport Noise and Track Keeping (NTK) sites being "live with others at various stages of planning and installation". Reference is then made to additional baseline noise level measurements were conducted in August 2016 at locations shown in Figure 7.8.1. The ES should clearly describe how the monitoring locations have been selected and the extent to which they are agreed with the relevant consultation bodies. The methodology used for the baseline noise surveys should be described in the ES and/or accompanying technical appendices. The Inspectorate recognises the importance of establishing an accurate and current baseline in order to determine the need for noise mitigation measures. The ES should demonstrate regard to the Airports NPS in this respect.	Baseline survey details are provided in Section 14.6. Baseline conditions have informed the development of mitigation, taking into account the requirements of the Airports NPS.
The Inspectorate notes the study area for the aircraft noise assessment is yet to be defined. The Inspectorate considers that the study area should include receptors beneath flight paths within the High Weald AONB, Surrey Hills AONB, Kent Downs AONB and South Downs National Park, including the potential for cumulative noise impacts with other development (including airports). This should also extend to the consideration of noise effects at heritage sites and historic parks and gardens that may be subject to adverse noise effects. Paragraphs 7.2.9 and 7.8.28 explain that the Applicant intends to consider such matters as part of the LVIA chapter, but the noise	Overflight analysis for landscape and visual and heritage assessments has been included up to 35 miles from the airport (see Sections 14.9 and 14.11.17).

Details	How/where addressed in PEIR
chapter should assess the potential for interrelated effects in this regard.	
The definition of the study area for the noise assessment should also assess noise effects of the Proposed Development on future residential amenity of existing allocations under the relevant local plan proposals where significant effects are likely to occur (with reference to the study area as informed by the noise modelling results).	An assessment of noise impacts on committed residential areas is provided in Section 14.11.17.
There is no reference to any consideration of noise sensitive ecological receptors in addition to human receptors. The ES should clearly identify the sensitive receptors considered in the impact assessment and include cross-referencing between aspect chapters, as appropriate.	There are no species that have been identified as specifically sensitive to noise in the study area.
Reference is made to the assessment years of 2026, 2029 and 2038. The ES should explain and assess the “maximum effect” in terms of noise generation which may not coincide precisely with the assessment years presented in the Scoping Report.	As explained elsewhere the runway opening date is now 2029 and noise is assessed in 2029, 2032, 2038 and 2047. An explanation as to why 2032 is the year of maximum effect is provided in Section 14.7.
NOEL, LOAEL and SOAEL are not defined in the main body of the Scoping Report in terms of the approach to the assessment, and no definition is provided anywhere in the Scoping Report for an Unacceptable Adverse Effect Level (UEAL). The ES should use and define these for the purposes of the assessment in line with the requirements of the NPSE. The Applicant has acknowledged the World Health Organization (Environmental Noise Guidelines for the European Region (2018)) at paragraph 7.8.2 of the Scoping Report. The Inspectorate notes that this publication recommends adverse effects from aircraft noise can begin at lower levels than the corresponding figures in The Environmental Noise (England) Regulations 2006. The Applicant should specifically address how this and other relevant guidance has been factored in to the defined NOEL, LOAEL, SOEAL and UEALs.	LOAELs and SOAELs for air, ground, traffic and construction noise are described in Section 14.4 based on national guidance including government guidance that takes account of WHO guidance since the NPSE was published in 2010. NOELs are referred to in the NPSE, but since only effects above the LOAEL require mitigation, a NOEL standard is not required for EIA purposes. UAELs are not mentioned in the NPSE. The Gatwick modelling shows zero population counts for air noise contours above the Heathrow UAELs $L_{eq,\ 16\ hour}$ 71 dB and $L_{eq,\ 8\ hour}$ 66 dB (Heathrow UAELs used as a reference point).
The ES should factor in relevant assumptions in relation to aborted landings based on actual statistics held by the Applicant. The Inspectorate considers that where the number of arrivals increase then the number of aborted landings will increase proportionally which could cause a higher than normal level of effect on noise	Aborted landings result in ‘go-arounds’, the standard procedure that occurs when an arriving aircraft aborts landing during the final stages of approach. They occur most often as a result of a departing aircraft or preceding arriving aircraft not

Details	How/where addressed in PEIR
sensitive receptors due to the low altitude and displaced location of the aircraft.	fully vacating the runway ahead of a landing aircraft. On these occasions the pilot takes averting action under a defined standard missed approach procedure. On westerly operations, typically these aircraft abort landing at low level, climb to 3,000 feet and loop round over Crawley to make a fresh approach to the runway. However, the CAA do not model noise from go-arounds at UK airports because their effect on the resultant noise contours is not significant. In the busy summer season in 2019 there were approximately three go-arounds each day. 85% of these occurred within the 16 hour day and evening period, with 15% at night (23:00-07:00 hours). The Project includes 8 new exit/entrance taxiways, plus the end around taxiways and has been designed so that the numbers of go-arounds do not significantly increase. As such, noise disturbance from go-arounds is not expected to increase.
The Inspectorate understands that future growth on a single runway operation will be achieved by 'peak spreading' as set out in section 4.5 of the Scoping Report and that this is also the case for the dual-runway operation (off peak periods are expected to experience a greater increase in ATMs than peak periods (paragraph 4.5.1, and as shown on diagram 4.5.1 of the Scoping Report). As such, although the summer months may still represent peak activity, the magnitude of change as a result of the Proposed Development is greater outside of these peak periods. Therefore, the ES should clearly set out how the use of the 'summer contours' accounts for the full impact of 'peak spreading'. The assessment should also include Lden and Lnight contours (in line with the Air Navigation Guidance 2017, CAP1616, and the Airports Commission noise 'scorecard') that are based on flights year round (therefore also accounting for flights outside the busy summer period).	Diagram 4.5.1 of the Scoping Report related to growth in air traffic without the Project and indicated clearly that the highest numbers of flights would continue to occur in the months of June to September (20% above winter months) as captured by the Leq noise modelling period from 16 June to 15 September. This is confirmed by current forecasts (see Chapter 4: Existing Site and Operation). Annual L_{den} and L_{night} contours are provided for baseline and with Project conditions in Section 14.6 and 14.9 to illustrate noise changes over the whole year including the winter months.
Paragraphs 7.8.31-44 do not specifically outline the approach in relation to construction noise, other than a brief statement in	The approach to assessment is set out in Section 14.4, with the assessment of

Details	How/where addressed in PEIR
paragraph 7.8.44 that effects of construction noise will be predicted and assessed using BS 5228. Assumptions around noise generating constriction activities and plant should be clearly presented in the ES to support understanding of the modelled assessment years and scenarios. The construction noise assessment should include criteria for the assessment of noise effects during weekends and night-time hours where such works are proposed or not otherwise restricted. In particular paragraph 5.3.18 of the Scoping Report explains that much of the construction work will take place overnight to reduce impact on the operation of the airport, and access roads. The outline CoCP should detail specific mitigation measures to address effects from such works where significant effects are likely. Impacts associated with the potential increased use of Crawley Goods Yard during the construction phase should be addressed as part of the assessment as such activities may also occur overnight.	construction noise and vibration provided in Section 14.9.
The ES should assess on-site noise emissions from fixed plant relating to the Proposed Development where likely significant effects could occur. Static sources should be assessed using BS4142: 2014 Methods for rating and assessing industrial and commercial sound. The ES should also include an assessment of groundborne noise from increased rail movements associated with the Proposed Development and any other relevant sources.	Noise emissions from fixed operational facilities are not expected to cause significant effects and will be assessed in the ES. Groundborne noise is not understood to be an issue for the railways around Gatwick and is not proposed to be assessed in the ES.
The peak period of construction traffic flows used to inform the assessment should be explained with reference to the schedule of construction activity. Given the spatial extent of the works, the assessment should also consider whether peak periods of activity may vary by receptor or groups of receptors. Table 5.4.1 of the Scoping Report explains that the construction of the Proposed Development is due to commence in 2022 with completion of the work between 2028-2034, thereby a construction phase of up to 12 years. The approach to the assessment of construction traffic should therefore ensure that it is suitably representative of such a duration. Paragraph 7.8.44 also states that “the assessment of construction traffic noise will be based on a period of peak traffic flow” whereas paragraphs 5.3.17 – 5.3.18 imply that the construction will be scheduled at night to minimise disruption (ie outside of peak traffic flows). The ES should define the worst case scenario in this respect or present both peak construction activity and peak traffic flow scenarios as part of the assessment of effects.	Two periods of peak construction traffic will be assessed in the ES. Construction noise has been modelled from the largest teams of plant expected to carry out the all the main works and assessed cumulatively as a worst case at this stage. The assessment will be updated when the construction programme is further refined for the ES. See Appendix 14.9.1.

Details	How/where addressed in PEIR
ES should explain how the Proposed Development interacts with the existing Noise Insulation Scheme prepared in accordance with the Noise Action Plan 2019-2024. If the assessment establishes that the action plan needs to be "enhanced as part of a package of noise mitigation measures" in order to mitigate adverse effects of the Proposed Development then the ES should explain how this will be achieved. The full package of potential mitigation measures will need to be presented as part of the ES and options explained in terms of a mitigation hierarchy as the Inspectorate considers noise insulation to be a 'last resort'. Where noise insulation is proposed, the ES should describe what forms of ventilation are proposed eg acoustic louvres and/or mechanical ventilation. The Inspectorate notes that there is no reference to a defined 'noise envelope' as referred to in paragraph 5.60 of the Airports NPS, and the Applicant should make efforts to agree the need for such provisions with relevant consultation bodies as a mechanism to manage noise effects.	A full package of mitigation is proposed, including a noise envelope (see Section 14.8).

14.3.4 Key issues raised during consultation and engagement with interested parties specific to the noise and vibration chapter are listed in Table 14.3.2, together with details of how these issues have been addressed within the PEIR.

Table 14.3.2: Summary of Consultation

Consultee	Date	Details	How/where addressed in PEIR
Crawley Borough Council, Mid Sussex District Council, West Sussex District Council, Reigate and Banstead District Council, Mole Valley District Council, Horsham District, Council Surrey County Council, East Sussex County Council and Kent County Council.	29/08/2019	DCO Project Local Authority Noise Topic Working Group stakeholder meeting. Noise assessment methodology.	Assessment methodology has taken into account comments raised, where appropriate, see Section 14.4.
	05/02/2020, 10/08/2021	DCO Project Local Authority Noise Topic Working Group stakeholder meetings. Noise assessment emerging results.	Assessment methodology was discussed resulting in clarifications in Section 14.4. Further detail of noise mitigation from construction, the Noise Insulation Scheme (NIS) and proposed noise envelope was requested and is added to Section 14.8. Appendix 14.9.5 has been prepared to describe

Consultee	Date	Details	How/where addressed in PEIR
			the proposed noise envelope in more detail.
CAA	07/05/2021	Meeting to discuss air noise assessment methodology	As reported in Section 14.4, various aspects of the noise assessment were discussed and agreed including the choice of noise metrics, the estimation of overflights and application of the DfT WebTAG workbook.

14.4. Assessment Methodology

Relevant Guidance

14.4.1 Section 14.2 provides a brief summary of the most recent policy that has informed the methodology (described later in this section) used to quantify and assess noise. Details of relevant guidance documents are provided in this section. A glossary of the acoustics terms and metrics used in this section is provided in Section 14.15.

British Standard Institution BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites (BSI, 2014a, b)

14.4.2 BS5228 provides a method for predicting noise levels, including a database of plant noise sound power levels, and a description of calculation procedures to enable noise to be predicted at NSRs. It also provides guidance on controlling construction noise and methods with which it can be assessed. The 'ABC' assessment method defines three thresholds, which can be used to determine when construction noise would cause significant noise effects. The appropriate threshold is selected on the basis of existing noise levels as set out in later in this section.

CAP 1616 Airspace Design: Guidance on the Regulatory Process for Changing Airspace Design including Community Engagement Requirements, fourth edition (CAA, 2021)

14.4.3 Government has been developing aviation policy, and hence aviation noise policy, since the completion of the Airports Commission work in 2015 (Airports Commission, 2015) because the industry is growing and, as confirmed in the Airports NPS (Department for Transport, 2018a), major changes are planned. In particular, a new runway at Heathrow is supported, maximising the use of existing infrastructure is promoted and a future aviation strategy is being developed to modify UK airspace. Some of these projects would bring about changes to flight paths which would be regulated and assessed separately under the CAA's airspace change process. CAP 1616 describes the requirements for airspace change and its Appendix B *Environmental Metrics and Assessment Requirements* includes guidance on noise assessment processes and metrics. The noise metrics used to assess the Project take account of this guidance as discussed later in this section. However, it is important when considering the noise impacts of the Project to note that the Project does not require the routings of aircraft to or from the airport to be changed, but rather increases the numbers of flights on existing routes, as discussed below.

14.4.4 The existing northern runway centreline is located some 198 metres north of the main runway centreline. The Project would increase the difference between the two runway centrelines by 12 metres. The existing northern runway is currently only used when the main runway is unavailable; for example, due to maintenance work at night. In the 2019 summer season (16 June to 15 September), the northern runway was used by 1,292 flights. The Project would make alterations to the existing northern runway, resulting in increased use of this runway using the same flight paths offset 12 metres to the north. The smaller ICAO 'Code C' aircraft (ie <36 metre wingspan (not larger types, eg B787 and A350)) would use the northern runway. Given the close proximity between the existing and proposed runway centrelines, and the fact that the existing northern runway is already in regular (if limited) use, any noise impacts of the Project would not be over areas currently unaffected by noise from Gatwick. This would therefore avoid most of the noise impacts often associated with new flight paths which are routed over areas not previously overflown. Nonetheless, the noise metrics recommended in CAP 1616 have been adopted where appropriate, as discussed within the Assessment Criteria and Assignment of Significance sub-section of this section.

BS 4142:2014+A1:2019 Methods for Rating and Assessing Industrial and Commercial Sound

14.4.5 BS 4142:2014+A1:2019 (BSI, 2019) defines the significance of noise effects, as rating levels, relative to background sound levels. The effect of an industrial development is described as:

- significant adverse, when the operational noise levels are 10 dB or greater above the measured background sound level, depending on context;
- adverse, when the operational noise levels are around 5 dB above the measured background sound level, depending on context; and
- low, where the rating level does not exceed the background sound level, depending on context.

14.4.6 In addition to the assessment against background sound levels, it is stated that *'where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background'.*

DMRB – Design Manual for Roads and Bridges

14.4.7 DMRB Volume 11, Section 3, Part 7 (LA111 – Noise and Vibration, Revision 2) (Highways England *et al.,* 2020) is published by Highways England and sets out requirements for the assessment and reporting of noise and vibration impacts for highways schemes. The guidance was updated in November 2019 and May 2020 with the intention of describing a proportionate approach to environmental assessment for highways, taking into account best practice and compliance with current relevant legislation.

14.4.8 The scope of analysis includes noise related to construction, vibration related to construction, and noise related to operation. The guidance states that operational noise assessments are required if the Project meets specific criteria involving expected increases in noise levels, proximity to sensitive receptors, and stakeholder expectations.

14.4.9 Predicted changes in operational noise are considered, together with comparisons of predicted noise levels to SOAEL and LOAEL thresholds. Methods for assessing the magnitude of impacts

and significance of effects are provided. Criteria for construction noise and vibration are also provided.

Scope of the Assessment

14.4.10 The scope of this PEIR has been developed in consultation with relevant statutory and non-statutory consultees and is detailed in Table 14.3.1 and Table 14.3.2.

14.4.11 The assessment of noise and vibration considers the likely significant effects arising from the construction and operation of the Project on:

- people, primarily where they live ('residential receptors') on an individual dwelling basis and on a community basis, including any shared community open areas;
- community facilities such as schools, hospitals, places of worship, community buildings; and
- commercial properties such as offices and hotels, collectively described as 'non-residential receptors.

14.4.12 Impacts may be adverse from increased noise, or beneficial from decreased noise, and may arise in the vicinity of the Project site or, in the case of traffic, in locations remote from the Project site.

14.4.13 Taking into account the scoping and consultation process, Table 14.4.1 summarises the issues considered as part of this assessment.

Table 14.4.1: Issues Considered within the Assessment

Activity	Potential Effects
Construction Phase (including Demolition): Noise and Vibration	
Construction and demolition activities, including upgraded highway junctions and use of construction compounds	Construction noise and vibration.
	Traffic noise.
	Construction traffic vibration.
Operational Phase: Noise and Vibration	
Use of airport, including upgraded highway junctions	Aircraft noise (air noise).
	Ground noise (aircraft on the ground, eg aircraft manoeuvring, engine ground running).
	Noise emissions from airport operations/plant (not aircraft).
	Traffic noise – upgraded highway systems, increased usage of airport and highway junctions. Traffic noise changes on existing roads not physically changed by the Project.

14.4.14 Effects which are not considered likely to be significant have been scoped out of further assessment. A summary of the effects scoped out is presented in Table 14.4.2.

Table 14.4.2: Issues Scoped Out of the Assessment

Issue	Justification
Designated 'Quiet Areas'	No 'Quiet Areas' designated within Local Plans or Neighbourhood Development Plans as Local Green Spaces or areas identified as Quiet Areas through implementation of the Environmental Noise (England) Regulations 2006 have been identified within the study area that could be affected by the Project. No impact pathway has been identified and, therefore, consideration of Quiet Areas has been scoped out of the assessment process.
Groundborne noise from railways	Groundborne noise is not understood to be an issue for the railways around Gatwick and has been scoped out of the EIA process.
Groundborne vibration from traffic	Operational vibration from traffic has been scoped out of the assessment methodology as a maintained road surface would be free of irregularities as part of design and under general maintenance, so operational vibration would not have the potential to lead to significant adverse effects, as confirmed in the most recent DMRB guidance.

Study Area

14.4.15 The study area for noise and vibration effects includes all receptors that may experience potential adverse impacts. For example, for some air noise metrics, this area extends more than 20 km from the airport and overflights are considered beyond this. Whereas for ground noise, the nearest receptors around the airport have been assessed, as at greater distances, the impacts would be lower. This approach has ensured that the most critical receptors have been considered.

14.4.16 The road traffic noise assessment study area for the Project was identified through modelling to understand which NSRs could potentially experience significant adverse effects. The modelled study area includes all roads that are anticipated to experience a change in road traffic noise from the Project, or where their position would be changed and could give rise to changes in noise levels at nearby properties. It does not include roads south of the airport's South Terminal, where traffic changes are not expected to result in significant noise changes.

14.4.17 Road links outside of the modelled study area have been assessed using a comparison of traffic flows to identify whether or not any significant changes in noise could be identified due to the Project.

Methodology for Baseline Studies

Desk Study

14.4.18 Aircraft ground noise predictions were undertaken for the current baseline situation for comparison with the results of the baseline noise level measurements. The source sound power level data for the aircraft taxiing around the airport were reviewed to ensure that appropriate assumptions were made in the modelling. Details of a literature review and study into relevant research are provided in Appendix 14.9.3 where the methodology is also discussed for obtaining up to date source sound power level data.

14.4.19 The air noise baseline for 2019 has been modelled by the CAA's Environmental Research and Consultancy Department (ERCD) using their ANCON noise model, which is validated each year

based on noise and flight track data collected by the Gatwick Noise and Track Keeping (NTK) system. In recent years, 32 locations have been used with typically eight in use at any one time. In April 2019, the system was upgraded to improve functionality and ease of access for the public online. In December 2020 the following 23 sites were live with others at various stages of planning and installation: Rusper, Russ Hill, Orltons, Oaklands Farm, Faygate, South Holmwood, Newdigate, Charlwood, Ifold, Alfold, Slinfold, Ruckmans, Kingsfold (all to the west), Moat House, Bellwood (Burstow), Outwood, Lingfield, Cowden, Hever Castle, Chiddingstone, Withyham (Crowborough) and Rusthall (all to the east) and Slinfold (to the north). The NTK data are used by GAL to respond to complaints, and to engage with the public over noise and track performance.

Site-Specific Surveys

14.4.20 For the ground noise assessment, baseline noise level measurements were conducted in August 2016 at 16 locations, 12 of which are considered to be relevant to the Project (see Figure 14.4.1). Measurements were conducted continuously over a two week period. Overall baseline noise levels are not likely to have changed significantly between mid-2016 and spring 2020 when the Covid pandemic began.

14.4.21 On-airport (airside) noise measurements to verify taxi noise levels were carried out in March and April 2019. The results of these measurements were used to determine more up to date source noise data to improve the accuracy of the modelling and to allow next generation aircraft to be taken into account within the changing fleet. See Appendix 14.9.3 for more details.

14.4.22 For road traffic noise, baseline conditions were modelled using the Predictor noise model. Calibration surveys were carried out in the Riverside Garden Park in May 2019 (see Appendix 14.9.4). For construction noise, the ground noise baseline survey results have been used, as similar areas and receptors are likely to be affected.

Assessment Criteria and Assignment of Significance

Methodology for Identifying Significant Effects

Overview

14.4.23 This section sets out the approach to identifying the significance of noise effects, beneficial and adverse, that are likely to arise from the Project. The methodology uses the following overarching concepts, explained in this section, as follows:

- significant effects, adverse and beneficial (due to noise levels and noise change resulting from the Project), including effects on health and quality of life;
- combined noise effects (due to the various Project noise sources); and
- cumulative noise effects (due to noise from the Project together with other proposed developments).

Effects on Health and Quality of Life

14.4.24 As described in 14.2, the Airports NPS (paragraph 5.68) states that: ‘Development consent should not be granted unless the Secretary of State is satisfied that the proposals will meet the following aims for the effective management and control of noise, within the context of Government policy on sustainable development:

- Avoid significant adverse impacts on health and quality of life from noise;

- Mitigate and minimise adverse impacts on health and quality of life from noise; and
- Where possible, contribute to improvements to health and quality of life.'

14.4.25 The approach to assessing noise effects from the Project therefore firstly identifies the potential for significant adverse effects on health and quality of life that may arise where noise at a receptor newly exceeds the SOAEL, and it identifies mitigation measures to avoid these. Secondly, the assessment identifies adverse effects that may arise above the LOAEL but below the SOAEL and identifies mitigation measures to minimise these as far as practicable. Thirdly, opportunities to reduce noise levels from the base case so as to improve health and quality of life have been explored.

Environmental Significant Effects

14.4.26 In addition to effects that exceed the SOAEL and result in significant adverse impacts on health and quality of life from noise that should be avoided, other likely significant environmental noise effects have been identified.

14.4.27 In line with the Airports NPS and the NPSE, the above approach is adopted for construction noise, air noise, ground noise, and road traffic noise, as explained in the following four sections. For each of the four types of noise, LOAELs and SOAELs are identified, and additional factors are described that inform the likely significance of an environmental effect, including effects where the noise level would be between the LOAEL and the SOAEL or where there would be a change in noise level. Methods used to predict levels are also summarised and metrics used to describe noise levels are also explained.

14.4.28 This PEIR chapter presents the preliminary findings of the assessment. As such, the conclusions presented here are preliminary and may be refined by further work throughout the EIA process and reported in the ES following consultation. Consequently, the assessment method may also develop further from that used in the PEIR. For example, consultation may reveal noise or vibration sensitive receptors with particular sensitivities requiring specific attention.

Combined Effects

14.4.29 Combined effects are those arising from the combination of different types of noise arising from the Project. As there is no reliable means of quantitatively assessing the overall noise effect resulting from different noise sources, this PEIR considers the overall effect of noise from combined sources qualitatively. This approach will also be used within the ES. Section 14.11 considers potential combined effects due to various types of noise.

Cumulative Effects

14.4.30 Cumulative effects that may arise as a result of the Project, when considered together with other proposed developments are considered in Section 14.11.

Inter-Related Effects

14.4.31 Section 14.11.17 provides noise impact information for the assessment of inter-related effects from noise, landscape and visual, historic environment and ecological/biodiversity impacts. The methodology used to assess effects on landscape, townscape and visually sensitive receptors, on receptors of historic importance and on ecological receptors is described in Chapters 7, 8, and 9 of this PEIR.

Construction Noise

Metrics

14.4.32 Construction noise has been assessed using BS5228-1:2009+A1:2014 (Code of practice for noise and vibration control on construction and open sites – noise) (BSI, 2014a). The metric used for construction noise assessment is the L_{Aeq}.

Noise Criteria

14.4.33 Construction noise has been assessed with reference to the 'ABC method' described in BS5228-1:2009+A1:2014. The ABC method defines the thresholds at building facades on the basis of existing noise levels as set out in Table 14.4.3.

14.4.34 Where the forecast construction noise exceeds the relevant threshold, this is an indicator of a potentially significant effect, ie where the level of impact is sufficient that it may lead to a likely significant effect once other aspects are considered.

14.4.35 For daytime, the widely used threshold of 75 dB L_{Aeq} (category C) being exceeded for one month or more has been taken to be the SOAEL for construction noise. The threshold was originally set to avoid interference with normal speech indoors, with windows closed (Wilson, 1963). The daytime SOAEL and the corresponding SOAELs for the evening and night periods (shown in Table 14.4.3) indicate likely significant effects on heath and quality of life at a receptor, assuming construction noise is dominant and of sufficient duration, as discussed below.

14.4.36 Also shown are the category A and B noise criteria, which are applied as the LOAEL assessment criteria from BS 5228 depending on the existing noise levels, as noted in Table 14.4.3.

Table 14.4.3: Airborne Sound from Construction – Impact Criteria at Residential Receptors (construction noise only)

Period	Assessment Category dB $L_{Aeq, T}$		
	A (LOAEL)	B (LOAEL)	C (SOAEL)
Day: T=12hr, Weekdays, 07:00-19:00, T=6hr, Saturday, 07:00-13:00	>65	>70	>75
Evenings and weekends: T=1hr, Weekdays 19:00–23:00, Saturdays 13:00-23:00, Sundays 07:00-23:00	>55	>60	>65
Night: T=1hr, Every day 23:00-06:00	>45	>50	>55

Notes:
All sound levels are defined at the façade of the receptor.
Assessment Category A: impact criteria to use when baseline ambient sound levels (rounded to the nearest 5 dB) are less than these values.
Assessment Category B: impact criteria to use when baseline ambient sound levels (rounded to the nearest 5 dB) are the same as category A values.
Assessment Category C: impact criteria to use when baseline ambient sound levels (rounded to the nearest 5 dB) are higher than category A values.

Significance of Effects

14.4.37 When predicted noise levels are above LOAEL thresholds, but below the SOAEL, other factors have been taken into account in determining whether the effect could be significant, such as the

number of people affected, and the duration of the activity causing the noise impact in determining the significance of the noise effects.

14.4.38 Taking account of these and considering any additional factors, the following ratings have been used to describe the significance of the predicted noise effects.

- **Negligible**: Below LOAEL or of short duration <1 month.
- **Minor**: Below SOAEL but above LOAEL with low noise exceedances (1-2 dB) or affecting low population size.
- **Moderate**: Above LOAEL with noise exceedances (>2 dB), or affecting high population size, but at levels not at SOAEL.
- **Major**: Above SOAEL, or above LOAEL affecting high population size.
- **Substantial**: Above SOAEL affecting high population size.

14.4.39 For the purposes of this assessment, effects of moderate significance and above are considered significant in terms of the EIA Regulations.

Air Noise

Air Noise Modelling

14.4.40 Air noise has been modelled using the CAA's ANCON v2.4 model, as used to produce Gatwick's noise exposure contours annually, and validated for Gatwick on an annual basis. The summer season contours for 2019 form the baseline, as reported below. Air traffic has been modelled for the four operational forecast years as described elsewhere in this report: 2029, 2032, 2038 and 2047. For the 2029, 2032, 2038 and 2047 scenarios, base case (do-minimum) and with Project noise modelling has been undertaken to allow comparisons between with and without Project cases in these years.

14.4.41 The basis of these models is the 2019 ANCON model. For current aircraft types, ANCON uses source noise levels, climb rates and dispersion within Noise Preferential Routes (NPRs) based on those measured in the NTK system at Gatwick. Noise emission levels from future aircraft types have been taken from the CAA's latest estimates and reported in the noise assessment, along with all other relevant input data. Further details are provided in Appendix 14.9.2. The noise modelling of all future cases, ie 2029, 2032, 2038 and 2047, is based on forecasts of air traffic movements and fleets expected to operate, so is unavoidably approximate albeit based on best available information at this stage. At the current time, as the aviation industry has been impacted by the Covid pandemic, there is some uncertainty as to how airlines will invest in new quieter aircraft in the future. To address this uncertainty a range of future fleets have been considered in the air noise modelling. The 'central case' fleet represents the transition envisaged from current generation to next generation, quieter, aircraft. The 'slower transition fleet' case represents a delayed transition leading to higher noise levels in the future, in both the future baseline and Project cases. Section 14.5 and Appendix 14.9.5 provide further details.

Primary and Secondary Noise Metrics

14.4.42 The following noise metrics are used to assess air noise in accordance with CAP 1616 (CAA, 2018).

14.4.43 Primary Noise Metrics:

- $L_{eq,\ 16\ hour}$ day 51 to 72 dB; and

- $L_{eq, 8\ hour}$ night 45 to 72 dB.

14.4.44 Secondary Noise Metrics:

- N65 day 20, 50, 100, 200, 500; and
- N60 night 10, 20, 50, 100.

14.4.45 N65 day refers to the number of aircraft during an average summer day above L_{max} 65 dB, while N60 night refers to the number of aircraft during an average summer night above L_{max} 60 dB. Thus, for example, an N65 day 20 contour plots the locations at which twenty noise events above L_{max} 65 dB occur on an average summer day.

14.4.46 Secondary Non-Noise Metric:

- Overflight (<7,000 feet) >48.5 degrees to the horizontal[3] (see Appendix 14.9.2 Section 3).

14.4.47 Flight paths above 7,000 feet would not be affected by the Project.

14.4.48 These noise metrics relate to the 92 day summer period from 16 June to 15 September, as used conventionally in the UK because it represents the busiest, and hence noisiest, season. A description of the noise metrics is presented in the glossary at Section 14.15.

14.4.49 $L_{eq, 16\ hour}$ day and $L_{eq, 8\ hour}$ night have been used as the primary metrics to quantify impacts in terms of the areas and population within the various 3 dB noise contour bands in the ranges above. Noise difference contours have also been used to show areas where noise levels are expected to increase and decrease.

14.4.50 In addition annual average L_{den} and L_{night} noise contours have been produced to illustrate the changes in noise levels averaged over the whole year.

Lmax Levels at Representative Community Locations

14.4.51 In addition to noise contours, more detail has been provided on the changes to be expected at a selection of specific locations that represent communities most affected:

- Rusper Primary School
- Charlwood Village Infant School
- Lingfield Primary School
- Chiddingstone Church of England School
- Capel Pre School
- Willow Tree Pre-school, Ifield; and
- Barnfield Care Home, Horley.

14.4.52 At these seven Community Representative Locations, the changes in noise to be expected as a result of the Project have been described in terms of changes in day and night noise levels ($L_{eq, 16\ hour}$ day and $L_{eq, 8\ hour}$ night), and in terms of numbers of aircraft above the day L_{max} 65 dB and night L_{max} 60 dB levels, for easterly and westerly operations. This is to provide greater detail as to the noise changes that affected communities can expect in terms of peak noise levels as well as accumulated noise levels.

[3] As defined in CAP 1498 Definition of Overflight (CAA 2017).

14.4.53 In addition to assessing impacts on residential properties, and those receptors listed above, air noise has been modelled and assessed at schools, hospitals, community buildings and places of worship.

Lmax Contours

14.4.54 The noise modelling assumes aircraft would fly along already used flight paths. Flight paths to and from the main runway would not be affected. Only departures would routinely use the northern runway (other than during maintenance of the main runway when arrivals and departures may use it as is the case now). These would fly straight ahead until they turn onto the relevant Standard Instrument Departure (SID) Route within the Noise Preferential Route generally 5 to 16 km from the end of the runway. These flight paths would be 210 metres north of the equivalent flight paths from the main runway. Thus, areas to the north of the existing extended runway centreline, to the east and to the west of the airport up to about 5 to 16 km from the runway ends, would experience more aircraft closer to them every day. The changes in noise from individual aircraft taking off on the northern runway compared to the main runway have been illustrated using L_{max} 60 dB contours.

Overflights

14.4.55 The methodologies for assessing airspace change (CAP 1616) adopted for the EIA process require an assessment of a new metric called overflight, and to consider overflights in two areas as follows.

- Air Noise – 'Overflight' as defined by CAP 1498 (CAA, 2017).
- Tranquillity – CAP 1616 requires consideration of increased overflights affecting particular areas, such as AONBs and National Parks.

14.4.56 This secondary non-noise metric, 'overflights' has been computed within a Geographic Information System, as described in Appendix 14.9.2, Section 3. Three-dimensional radar tracks from 128,000 aircraft flying to and from Gatwick and other airports within 35 miles of Gatwick were analysed to count overflights below 7,000 feet in accordance with the CAA guidance. The results are used to illustrate how the numbers of overflights would change with the Project.

Noise Criteria

14.4.57 In order to follow the approach required in the NPSE, it is necessary to define the LOAEL and SOAEL for aircraft noise.

14.4.58 LOAELs are provided in the Consultation Response on UK Airspace Policy: A Framework for Balanced Decisions on the Design and Use of Airspace (Department for Transport, 2017b), as described in paragraph 14.2.27.

14.4.59 SOAELs are defined with reference to Government expectations of compensation and noise insulation schemes specified in the Aviation Policy Framework (2013). For daytime, the SOAEL is set at $L_{eq,\ 16\ hour}$ 63 dB. This represents the exposure level at which the most recent UK annoyance survey (CAA, 2014) indicates that 23% of the population would be highly annoyed. The SOAEL value for night-time is taken from the interim target of the WHO Night Noise Guidelines 2009 at $L_{eq,\ 8\ hour}$ 55 dB, which is described in those guidelines as the level above which *'Adverse health effects occur frequently, a sizeable proportion of the population is highly annoyed and sleep-disturbed.'* (WHO, 2009).

14.4.60 The LOAELs and SOAELs for air noise are summarised in Table 14.4.4.

Table 14.4.4: Air Noise LOAELs and SOAELs

Issue	LOAEL	SOAEL
Day	$L_{eq,\ 16\ hour}$ day 51 dB	$L_{eq,\ 16\ hour}$ day 63 dB
Night	$L_{eq,\ 8\ hour}$ night 45 dB	$L_{eq,\ 8\ hour}$ night 55 dB

Significance of Effects

14.4.61 The evaluation of significant air noise effects has been undertaken in two stages.

- If the level is newly above SOAEL as a result of the Project – a significant effect on health and quality of life that should be avoided is likely, subject to consideration of any additional factors present.
- If the level is below SOAEL but above LOAEL as a result of the Project, then the following have been considered:

  - How large is the noise change?
  - How large is the population affected?
  - How close is the noise level to SOAEL?

14.4.62 In the first stage, a significant effect is likely if the noise level is or would be below SOAEL in the base case but rises above it as a result of the Project. A significant effect can arise at a single property or at a group of properties. Additional factors that could affect this include the use and nature of the receptors, other noise sources and the duration of the effect.

14.4.63 In the second stage assessment where the predicted noise level is below SOAEL but above LOAEL, the first consideration is the extent of noise change; increases leading to adverse impacts, decreases leading to beneficial impacts. CAP 1616 (paragraph 1.31) can be used to give the following L_{eq} ranges.

- Negligible <1 dB
- Low 1-2 dB
- Medium 3-5 dB
- High 6-9 dB
- Very High >9 dB

14.4.64 The second consideration is how many people are affected by the noise increase. The following ranges have been drawn from Institute of Environmental Management and Assessment (IEMA) Guidance on Environmental Noise Assessment (IEMA, 2014). It is noted that these ranges have also been used in the PEIR produced for the third runway at Heathrow, with reference to that project's Noise Expert Review Group.

- Very Low 10-99
- Low 100-399
- Medium 400-699
- High 700-1000
- Very High >1,000

14.4.65 The third consideration is how close the predicted noise level is to the SOAEL, with noise levels closer to SOAEL more likely to give rise to significant effects.

14.4.66 Noise assessment takes account of the difference in the sensitivity of different NSRs by applying different LOAEL and SOAEL values to different types of buildings, if necessary, to assess impacts. This assessment considers residential buildings, which are sensitive during the day and night. All residential buildings are assumed to be similarly sensitive, unless they have noise insulation, as discussed below. The LOAELs and SOAELs given above are for residential buildings. The assessment also considers hospitals, which are sensitive during the day and night, and it considers schools, places of worship and community buildings that are sensitive to noise in the daytime and evening only. For non-residential buildings, sensitivity to noise tends to depend not just on the building use, but also its construction and other factors. For non-residential buildings specific noise assessment criteria are used where significant noise increases are expected, with reference to their particular use, design and circumstances.

14.4.67 Noise insulation forms part of the noise control measures relied upon to avoid significant adverse effects on health and quality of life in line with Government policy (Department for Transport, 2018a).

14.4.68 Taking account of these additional factors, the following noise effect ratings have been used to describe the significance of the predicted noise effects.

- **Negligible**: Below LOAEL, or above LOAEL negligible noise change (<1 dB) affecting high or very high population size, or high noise change affecting low population size.
- **Minor**: Below SOAEL but above LOAEL with low noise changes (1-2 dB), or affecting low population size, or at levels not near SOAEL.
- **Moderate**: Above SOAEL. Or above LOAEL with noise changes of medium or above (>3 dB), or affecting high population size, but at levels not close to SOAEL.
- **Major**: Above SOAEL. Or above LOAEL with noise changes above medium, or affecting high population size, near SOAEL.
- **Substantial**: Above SOAEL by a margin affecting high population size.

14.4.69 The assessment of significance is based primarily on the predicted levels and changes in the primary noise metrics, but additional noise metrics (the secondary noise metrics) are used to provide more detail on the changes that would arise.

14.4.70 For the purposes of this assessment, effects of moderate significance and above are considered significant in terms of the EIA Regulations.

Ground Noise

Metrics

14.4.71 The assessment of aircraft ground noise has been carried out by comparing the predicted noise levels against benchmark criteria for the LOAEL and SOAEL, defined for the night-time and daytime hours separately, and by comparing the predicted change in noise levels arising at receptors around the airport against the baseline noise levels.

14.4.72 Ground noise has been assessed using a methodology closely aligned with air noise and, for this reason, similar metrics are used. The primary metric used for assessment is the L_{Aeq} as defined over the 16 hour daytime period (07:00-23:00) and the 8 hour night-time period (23:00-07:00) and

predicted for an average day over the 92 day summer period. A secondary metric that is used to assess ground noise is the L_{max} which is used to assess the peak level of noise that could be expected from ground noise rather than the inherent average value that is represented by the primary L_{Aeq} metric. The secondary L_{max} metric is calculated separately for a number of individual noise sources including aircraft taxiing, engine ground runs, APU operation on stands and end around taxiway (EAT) usage since the peak levels are experienced as individual events.

Noise Criteria

14.4.73 The LOAELs and SOAELs for ground noise (L_{Aeq}) are the same as for air noise, as listed in Table 14.4.4. This approach to setting the observed effect levels is considered appropriate and is also in line with the approach adopted in the PEIR produced for the third runway at Heathrow.

14.4.74 For maximum noise levels, L_{max} occurring at NSRs from aircraft ground noise, a potentially significant effect is defined as occurring if there are sufficient numbers of noise events over the following thresholds:

- during the night-time (23:00-07:00 hours) L_{max} 60 dB; and
- during the daytime (07:00-23:00 hours) L_{max} 65 dB.

14.4.75 The 60 dB L_{max} night-time benchmark is referred to in Planning and Noise (Association of Noise Consultants *et al.*, 2017) where it is stated that the number of noisy events exceeding 60 dB L_{max} may be inversely related to the quality of sleep. It is also the basis of the N60 metric used as a supplementary metric for air noise at night. $L_{max.}$ 65 dB is the basis of the N65 noise metric that is used as a supplementary metric for air noise during the day,

14.4.76 The secondary L_{max} metric is calculated for a number of different ground noise activities separately (as listed above) and then the number of events are looked at as a whole. If there are fewer than 10 events predicted to occur above the criteria specified, then the noise impact is considered less likely to give rise to a significant effect. Guidance on the effects of increasing numbers of events above the L_{max} threshold has been taken from the air noise secondary metrics and professional judgement relating to the numbers of events has been used to help determine the magnitude of impact:

- N65 day 20, 50, 100, 200, 500; and
- N60 night 10, 20, 50, 100.

Significance of Effect

14.4.77 The significance of the effects of aircraft ground noise on NSRs has been determined by taking into account the sensitivity of the receptor, the magnitude of the impact and other factors as follows. As with other types of noise the sensitivity of the receptor is accounted for in the numerical value of the LOAEL and SOAEL. The focus of this assessment is on residential receptors. A nursery, a primary school and a mental health facility have also been identified, and are all considered to be of high sensitivity and are assessed on a case by case basis. However, there are around 2,500 receptors, both residential and non-residential buildings, that have been modelled within the LOAEL (but outside the airport boundary) and of these, around 10 are on the list of noise sensitive buildings (including schools, hospitals and community spaces) identified for the air noise assessment. Since some of these receptors may be considered more sensitive, predictions will be carried out for these 10 (or so) locations so that they can be assessed specifically within the ES.

14.4.78 As with air noise, in the first stage, a significant effect is likely if the noise level is or would be below SOAEL in the base case but rises above it as a result of the Project. A significant effect can arise at a single property or at a group of properties. Additional factors that could affect this include the use and nature of the receptors, other noise sources and the duration of the effect and if the receptor has noise insulation.

14.4.79 In the second stage assessment where the predicted noise level is below SOAEL but above LOAEL, the first consideration is the extent of noise change; increases leading to adverse impacts, decreases leading to beneficial impacts.

14.4.80 To assess the change in the noise above the LOAEL the same magnitudes of noise change as for air noise have been used, as follows.

- Negligible <1 dB
- Low 1-2 dB
- Medium 3-5 dB
- High 6-9 dB
- Very High >9 dB

14.4.81 The same terms are used to describe corresponding decreases.

14.4.82 The change in noise level and the secondary L_{max} metric have also been used to assist in determining the magnitude of impact.

14.4.83 Where the level of ground noise is below SOAEL but above LOAEL as a result of the Project, the evaluation of significant effects considers the magnitude of the noise change and other factors including:

- how large is the noise change?
- how large is the population affected?
- how close is the noise level to SOAEL?

14.4.84 Taking account of these additional factors, the following noise effect ratings are used to describe the significance of the predicted noise effects.

- **Negligible**: Below LOAEL, or above LOAEL with negligible noise change (<1 dB) affecting high or very high population size, or above LOAEL with high noise change affecting low population size.
- **Minor**: Below SOAEL but above LOAEL with minor noise changes (1-3 dB), or affecting low population size, or at levels not close to SOAEL.
- **Moderate**: Above SOAEL. Or above LOAEL with noise changes of moderate or above (>3 dB), or affecting high population size, but at levels not close to SOAEL.
- **Major**: Above SOAEL. Or above LOAEL with noise changes above moderate, or affecting high population size, close to SOAEL.
- **Substantial**: Above SOAEL by a margin affecting high population size.

14.4.85 It is noted that the above changes are initially considered as changes in predicted ground noise alone. However, where the overall measured baseline across all sources is high, other sources, primarily road traffic noise, may lessen the effect of changing ground noise and the resulting change in overall noise levels may be lower than the predicted changes in ground noise. Therefore, where high overall noise levels have been measured, the likely effect of other sources

of ambient noise has been taken in to account in the assessment of significance of the change in ground noise.

14.4.86 Where a range of significance levels are presented based on differing magnitudes of impact and modifying factors, the final assessment for each effect is based upon professional judgement.

14.4.87 As for air noise, the assessment of significance is based primarily on the predicted levels and changes in the primary noise metrics, but the noise metric (the secondary L_{max} noise metric) is used to provide more detail on the changes that would arise.

14.4.88 For the purposes of this assessment, effects of moderate significance and above are considered significant in terms of the EIA Regulations.

Road Traffic Noise

Metrics

14.4.89 The key metric used for the assessment of road traffic noise during the day in the UK is the $L_{A10,\ 18\ hour}$ which is referred to in the DMRB and the Noise Insulation Regulations, and which is predicted using the methodology in the Calculation of Road Traffic Noise (CRTN) guidance document (Department of Transport, Welsh Office, 1988). The DMRB also refers to the $L_{night,\ outside}$, which is effectively equivalent to a free-field $L_{eq,\ 8\ hour}$.

Criteria

14.4.90 The DMRB specifies values to define the LOAEL for road traffic noise. The daytime LOAEL value is 55 dB $L_{A10,\ 18\ hour}$ at the façade of the building, to consider effects of annoyance. A LOAEL of 40 dB $L_{Aeq,\ 8\ hour}$ night in the free-field has been adopted based on DMRB to consider effects from sleep disturbance.

14.4.91 The SOAEL value for daytime road traffic noise is 68 dB $L_{A10,\ 18\ hour}$ at the façade based on the Noise Insulation Regulations, where 68 dB $L_{A10,\ 18\ hour}$ is the trigger level for insulation from new or altered highways. The DMRB also proposes the value quoted in the regulations.

14.4.92 The SOAEL value for night-time road traffic noise is consistent with the interim target of the WHO Night Noise Guidelines 2009 at 55 dB $L_{Aeq,\ 8\ hour}$ to avoid sleep disturbance.

14.4.93 The LOAELs and SOAELs for road traffic noise are summarised in Table 14.4.5. The DMRB notes that specific variations may be required (eg where upgraded noise insulation has been fitted to a property). These will be reviewed in the ES.

Table 14.4.5: Traffic Noise LOAELs and SOAELs

Issue	LOAEL	SOAEL
Day	$L_{A10,\ 18\ hour}$ day 55 dB (façade)	$L_{A10,\ 18\ hour}$ day 68 dB (façade)
Night	$L_{eq,\ 8\ hour}$ night 40 dB (free-field)	$L_{eq,\ 8\ hour}$ night 55 dB (free-field)

Significance of Effects

14.4.94 As stated in the overall approach to noise assessment above, when predicted noise levels are newly above the SOAEL significant effects are likely, and mitigation measures have been identified to avoid these. However, for traffic noise, more specific procedures for establishing

significance based on considering LOAEL and SOAEL values and other factors are set out in the DMRB, and these have been adopted for the road traffic noise assessment.

14.4.95 The DMRB procedures include a scoping procedure which determines whether further comparison should be undertaken. This procedure consists of two acoustic tests relating to noise change, and non-acoustic tests to determine whether new road links (or roads physically changed by the Project) would be within 600 metres of receptors, and whether there would be a reasonable stakeholder expectation that an assessment would be undertaken. In this case both of the non-acoustic tests are met, and therefore a preliminary assessment of noise impacts is included here and a more detailed assessment will be included within the ES.

14.4.96 For the PEIR, the available traffic information has been used to make an initial assessment of the likely significance of the effects. This has used the scoping procedure set out within the DMRB to identify the relevant road links – for roads which are not physically changed by the Project, this is usually restricted to an area within 50 metres of the roads.

14.4.97 For road links requiring consideration, the DMRB sets out an initial procedure for assessment based on the noise change. There are two sets of noise magnitude criteria in the DMRB which apply to people's noise reaction to road changes following the opening of a road, and to the situation when the road has been open for some time, and has become an established part of the noise environment.

14.4.98 To assess the change in the noise above LOAEL the following magnitudes of noise change are used for the short term, i.e. the comparison in the year of opening, drawn from the DMRB[4]:

Table 14.4.6: Traffic Noise Change Magnitude, Short Term

Short Term Magnitude	Short Term Noise Change (dB)
High	Greater than equal to 5.0
Medium	3.0 to 4.9
Low	1.0 to 2.9
Negligible	Less than 1.0

14.4.99 To assess the change in the noise above LOAEL the following magnitudes of noise change are used for the long term, i.e. the comparison 15 years after opening, drawn from the DMRB.

Table 14.4.7: Traffic Noise Change Magnitude, Long Term

Long Term Magnitude	Long Term Noise Change (dB)
High	Greater than equal to 10.0
Medium	5.0 to 9.9
Low	3.0 to 4.9
Negligible	Less than less than 3.0

[4] It is noted that in DMRB the terms Negligible, Minor, Moderate, and Major are used to describe the magnitude of change criteria above rather than Negligible, Low, Medium and High, but in this PEIR a consistent terminology has been taken in all sections, and therefore the terms negligible, low, medium and high have therefore been used to describe magnitude here.

14.4.100 The same terms are used to describe increases and decreases.

14.4.101 The DMRB indicates that impacts of medium or high magnitude are more likely to give rise to significant effects. However, other factors are considered to determine the final operational significance level. These include: whether the noise change is close to a boundary between two impact magnitude ratings (eg whether it is close to the boundary between a low and a medium impact); whether the change in the long term is similar to the short term change (and therefore whether the difference may not be due to the Project); the location of noise sensitive parts of the receptor; changes in acoustic context (including effects on acoustic character of an area); and whether the Project results in obvious changes in the landscape or setting of a receptor which make it likely that noise level change would be more acutely perceived. These factors can affect the point at which noise changes are considered likely to give rise to a likely significant effect.

14.4.102 A final factor is considered if the 'with Project' noise level exceeds the SOAEL, and this is to consider noise change in the short term of 1 dB or over as resulting in a likely significant effect. This is more stringent than when noise levels are below SOAEL when noise changes in the short term of 3 dB or over are classed as more likely to be significant.

14.4.103 Where adverse effects may arise above the LOAEL but below the SOAEL, mitigation measures have been identified to minimise these as far as practicable. Opportunities to reduce noise levels from the baseline case and identify improvements to the noise environment have also been explored. This is particularly relevant to the assessment of traffic noise where it has been possible to design additional mitigation into the proposed highway design.

14.4.104 For the purpose of this assessment, impacts of medium magnitude (moderate significance) and above are considered likely to give rise to a significant effect at individual properties, as identified within the DMRB, unless the factors discussed above indicated that effects of low magnitude (minor significance) may give rise to significant effects. In this respect, significance has been determined taking into account the advice in DMRB and other factors that may affect the significance of the overall effect in line with normal EIA practice.

14.5. Assumptions and Limitations of the Assessment

Construction Noise

14.5.1 Construction noise has been modelled from the main works required to construct the Project based on current knowledge of the likely construction works programme, as outlined in Chapter 5: Project Description. At this stage the programme of works has allowed the main construction works areas to be grouped into 13 periods: the 12 individual years between 2024 and 2035 and the period 2036 to 2038. In order to not under-estimate the possible cumulative effect of overlapping works, all works likely to occur within any of these periods have been modelled concurrently, resulting in thirteen noise models. For each type of work, indicative noise emission levels have been taken from equivalent projects and modelling during the day, evening and/or night periods according to current understanding from the construction team.

14.5.2 Minor works or those expected to last less than a month have been excluded as they are unlikely to lead to significant effects. Vibration from construction works will be assessed as details of methods of working develop, such as piling of the highway works, and will be reported in the ES.

Air Noise

14.5.3 The air noise assessment assumes the routing of aircraft to and from the main runway and from the northern runway would remain as it is today, as discussed in Section 14.4. This is because the Project can operate using these routes without need for an airspace change process. When the likely outcome of the FASI-South airspace is known then the noise impacts of that change will be assessed following the relevant guidance. Further details of FASI-South and the approach are set out in Chapter 6: Approach to Environmental Assessment.

14.5.4 The air noise assessment is based on the air traffic forecasts summarised in Section 14.7. The accuracy of the assessment depends primarily on these forecasts in terms of the number and types of aircraft that will operate in the future. Estimations of the noise emissions of future aircraft types are also important. These have been made by the CAA based on the latest state of knowledge as reported in Section 3 of Appendix 14.9.2 and clearly show the extent to which newer aircraft types are quieter than their older equivalents.

14.5.5 In 2019 about 13% of the aircraft operating at Gatwick were 'next generation' aircraft, eg A320 NEO, B737 MAX etc, which are quieter than 'current generation' aircraft. As aircraft age, airlines replace them with next generation aircraft so that over time the fleet transitions to next generation aircraft and, other things being equal, overall noise levels reduce. The ATM forecasts used for the modelling of noise in the future are based on estimates of how the fleet will transition based on assumptions around airlines' fleet procurement programmes and business models. The '*central case'* used in the noise assessment is based on what is considered today to be the most likely rate of fleet transition. However, there is uncertainty around this, particularly at the current time due to the global pandemic and the financial impact on the airlines. Therefore noise modelling has also been carried out for a '*slower transition fleet'* case, based on ATM forecasts in which the rate of fleet transition is delayed by about five years and which would result in higher noise levels than the central case. Appendix 14.9.2 gives further details. The assessment reported in this chapter gives full details of noise levels expected from the central case fleet forecast and gives the ranges of noise levels expected under the central and slower fleet transition cases. Full results of all noise modelling are provided Section 5 of Appendix 14.9.2.

14.5.6 Appendix 14.9.2 also provides a sensitivity analysis of the effect of varying the runway modal split giving an indication of the range of possible noise contours that could arise.

Ground Noise

14.5.7 The aircraft ground noise assessment in this report covers taxiing noise, engine testing and APU noise but does not cover reverse thrust. Reverse thrust is included in the air noise assessment. Engine testing at idle power on aircraft stands immediately prior to departure as part of normal operations is subsumed within normal taxiing operations and is not separately identifiable at receiver locations outside the airport boundary.

14.5.8 Topographical noise barriers and acoustic walls have been included in the model (bunds are included as part of the general topography) as these form an essential part of existing and future mitigation measures in place for airport ground noise.

14.5.9 Predictions of aircraft ground noise have been carried out using a bespoke prediction model implemented in the noise modelling software CadnaA. Modelling has been carried out for an average day based on the 92 day summer period (as used for air noise) and the assessment is

focused on the 12 assessment locations discussed at paragraph 14.4.19. The pattern of ground operations on the airfield is different between the two runway modes of operation (26 and 08). The differences are more marked than for air noise and unlike air noise there is no research to indicate that overall effects are best assessed using long term average noise levels. As a result, noise predictions for the two runway modes are reported separately. Details of the bespoke ground noise prediction model which is used in the assessment are provided at Appendix 14.9.3.

14.5.10 The aircraft ground noise results are presented for daytime and night-time periods because the night period is more sensitive than the day and some taxi-routes are different at night.

Road Traffic Noise

14.5.11 The DMRB states that noise levels should be assessed in both the year of opening of a road scheme and at a future assessment year which represents 15 years after opening. The first year of assessment for road traffic noise has been taken to be 2032 (by which date key highway works would be completed and operational). A future year representing 15 years after opening, 2047 has also been considered.

14.5.12 Data for traffic flows in the night-time are not currently available. It is considered to be unlikely at this stage that night-time noise will give rise to significant effects because noise changes during the day are usually larger than during the night, however, this will be confirmed in the ES.

Conclusions

14.5.13 As the Project design progresses, the details required for an updated assessment of noise and vibration impacts will become available to inform the final assessment reported in the ES. At this stage, the assessment focuses on the main impacts and the mitigation measures likely to be necessary. For the PEIR, sufficient information on the Project has been made available to identify the key sources of potential significant effects, to assess them and to outline the required mitigation measures.

14.6. Baseline Environment

Current Baseline

Construction Noise

14.6.1 The baseline noise environment for the construction noise assessment is assumed to be unchanged from that measured in 2016, as reported under ground noise below.

Air Noise

Aircraft Operations

14.6.2 Noise levels from Gatwick Airport are reported annually from noise modelling carried out by the Environmental Research and Consultancy Department of the CAA. The annual reports also record the numbers and pattern of flights that generate the airports' noise contours for the summer period used in their noise modelling. The numbers of flights in the day and night period in 2019 are listed in Section 14.7 below. In general, aircraft would take-off and land into a headwind for safety and performance reasons to maximise lift during take-off and landing. The wind direction, which varies over the course of a year, would therefore have an important influence on the usage of runways. The ratio of westerly (ie Runway 26) and easterly (ie Runway 08)

operations is referred to as the runway modal split. In the summer daytime of 2019 this was 73% westerly and 27% easterly. Because wind conditions vary from year to year, so does modal split. To facilitate year on year comparisons, two sets of noise contours are produced each year:

- using the 'actual' modal split over the L_{eq} day period; and
- assuming the 'standard' modal split over the L_{eq} day period, ie the long-term modal split calculated from the 20-year rolling average.

14.6.3 For 2019, this was the 20-year period from 2000 to 2019. The 16 hour daytime 'standard' modal split in 2019 was 75/25 and this modal split has been used in the baseline and all forecast years used in this assessment.

14.6.4 Wind conditions at night vary from those in the daytime, so modal splits can be slightly different. The night-time actual runway modal split for the 2019 summer period was 72% westerly and 28% easterly. The summer night-time 10-year (2010-2019) average modal split was 75% westerly 25% easterly, and this modal split has been used in all baseline and forecast years used in this assessment. The night-time standard modal split is averaged over 10 years because night-time contours have not been produced for so long at daytime contours, so older values are not available.

14.6.5 Aircraft leaving Gatwick Airport depart along Standard Instrument Departure (SID) routes; five to the west and four to the east. Aircraft arriving into Gatwick Airport are routed from the south to converge on the extended runway centrelines where they join the Instrument Landing System to arrive at the thresholds to runway 26 and 08. Further details are available in CAA ERCD Report 2002: Noise Exposure Contours for Gatwick Airport 2019 (CAA, 2020).

Primary Noise Metrics

14.6.6 The air noise baseline in 2019 can be summarised in general terms using the primary noise metrics (described below) in Table 14.6.1.

Table 14.6.1: 2019 (Standard Mode) Air Noise Baseline, Leq Day and Night

Noise Metric	Noise Contour Area (km^2)	Population
$L_{eq,\ 16\ hour}$ day:		
>51 dB	136.0	24,050
>54 dB	74.0	9,850
>57 dB	38.7	2,550
>60 dB	22.4	1,450
>63 dB	12.6	500
>66 dB	6.7	250
>69 dB	3.5	100
$L_{eq,\ 8\ hour}$ night:		
>45 dB	159.4	27,650
>48 dB	90.3	12,100
>51 dB	46.5	5,550

Noise Metric	Noise Contour Area (km^2)	Population
>54 dB	24.8	1,550
>55dB	22.6	1,250
>57 dB	14.0	750
>60 dB	7.4	300
>63 dB	3.8	150

14.6.7 Figure 14.6.1 shows the 2019 Baseline, $L_{eq,\ 16\ hour}$ contours. The population currently within the LOAEL $L_{eq,\ 16\ hour}$ 51 dB contour is approximately 24,050 people (9,400 households). The population currently within the SOAEL $L_{eq,\ 16\ hour}$ 63 dB contour is approximately 500 people (150 households). These properties lie within the existing Noise Insulation Scheme (NIS) boundary, discussed in Section 14.8 below, with the exception of two residential properties in the Partridge Lane area west of Charlwood.

14.6.8 Figure 14.6.2 shows the 2019 Baseline, $L_{eq,\ 8\ hour}$ night contours. The population currently within the LOAEL $L_{eq,\ 8\ hour}$ night 45 dB contour is approximately 27,650 people (10,800 households). The population currently within the SOAEL $L_{eq,\ 8\ hour}$ 55 dB contour is approximately 1,250 people (500 households). These properties lie within the existing NIS boundary, discussed in Section 14.8 below, with the exception of a few in Northchapel, several west of Charlwood on Russ Hill Road and Partridge Lane, and two south of the A23 south of the airport.

Secondary Noise Metrics

14.6.9 In addition to the primary L_{eq} noise metrics reported above, the air noise baseline in 2019 can be quantified using the Number Above metrics, N65 day and N60 night, in Table 14.6.2. The Number Above metrics identify the number of aircraft during an average summer day and night above a certain peak noise threshold (L_{max} 65 dB for day and L_{max} 60 dB for night).

Table 14.6.2: 2019 (Standard Mode) Air Noise Baseline, N65 Day and N60 Night

Noise Metric (number of aircraft)	Noise Contour Area (km^2)	Population
N65 day:		
>20	149.9	24,100
>50	97.7	14,600
>100	72.7	9,500
>200	50.8	5,750
>500	2.4	100
N60 night:		
>10	204.2	33,850
>20	126.8	15,250
>50	56.4	7,600
>100	2.7	150

14.6.10 Figure 14.6.3 shows the 2019 Baseline N65 day contours. The population currently exposed to at least 20 aircraft noise events above L_{max} 65 dB on an average summer day is approximately 24,100.

14.6.11 Figure 14.6.4 shows the 2019 Baseline, N60 night contours. The population currently exposed to at least 10 aircraft noise events above L_{max} 60 dB on an average summer night is approximately 33,850.

14.6.12 In addition, and to illustrate noise levels over the whole year, annual average Day, Evening Night (L_{den}) and Night (L_{night}) noise levels have also been modelled, consistent with common practice in the European Union and associated regulations. The areas and population within these contours are summarised in Table 14.6.3.

Table 14.6.3: 2019 (Standard Mode) Annual L_{den} and L_{Night} Baseline Noise Levels (1)

Noise Metric	Noise Contour Area (km²)	Population
L_{den}:		
>55 dB	92.1	12,900
>60 dB	31.5	2,000
>65 dB	12.2	550
>70 dB	4.1	150
>75 dB	1.6	0
L_{night}:		
>45 dB	116.0	17,150
>50 dB	39.8	4,300
>55 dB	15.2	750
>60 dB	5.4	200
>65 dB	2.0	0
>70 dB	0.8	0

14.6.13 Figure 14.6.5 shows the annual average 2019 Baseline L_{den} contours.

14.6.14 Figure 14.6.6 shows the annual average 2019 Baseline L_{night} contours.

Secondary Non-Noise Metrics

14.6.15 Figure 14.6.7 shows the 2018 baseline for Gatwick Airport overflights (2019 was within 1% of 2018, see Appendix 14.9.2). The area within which there is at least one overflight on an average summer (24 hour) day extends approximately 50 km east and west of the airport, and approximately 30 km south and extending further to the south coast over Seaford where there is an air navigation beacon. The densities of overflights increase closer to the airport, particularly under the two arrivals swathes that loop in from the south to both extended runway centrelines.

14.6.16 Figure 14.6.8 shows the 2018 baseline for Non-Gatwick Airport overflights within 35 miles (56 km) of the centre of Gatwick Airport. Areas around Gatwick where there are overflights from other airports can be seen, for example, north of Gatwick with flights from Heathrow and Redhill

aerodrome, east of Gatwick with other flights over Tunbridge Wells and further south, and near the south coast over Worthing, Brighton etc.

14.6.17 Figure 14.6.9 shows the 2018 baseline overflights for aircraft from all airports within 35 miles (56 km) of the centre of Gatwick Airport.

Ground Noise

14.6.18 Baseline ground noise levels have been assessed at the nearest NSRs listed below and as shown in Figure 14.4.1.

- 1 Blue Cedars
- 2 3 Charlwood Road
- 3 Brook Farm
- 4 Bear and Bunny Nursery
- 5 April Cottage
- 6 Oakfield Cottage
- 7 103 Cheyne Walk
- 8 82 The Crescent
- 9 Hyders Farm House
- 10 Myrtle Cottage
- 11 Rowley Farmhouse
- 12 Trent House.

14.6.19 For the assessment of ground noise, around the perimeter of the airport, baseline L_{Aeq} noise levels over the day (07:00-23:00) and night (23:00-07:00) periods have been predicted for easterly operations ('runway 08') and westerly operations ('runway 26') using the model (as described elsewhere) validated from the results of baseline noise measurements in 2016. Appendix 14.9.3 gives details of the baseline survey and Table 14.6.4 gives the modelled baseline noise levels.

Table 14.6.4: Summary of Ground Noise 2016 Predicted Baseline Noise Levels (dB L_{Aeq})

Descriptor	Location ($L_{Aeq,T}$ dB)											
	Blue Cedars (1)	3 Charlwood Road (2)	Brook farm (3)	Bear and Bunny Nursery (4)	April Cottage (5)	Oakfield Cottage (6)	103 Cheyne Walk (7)	82 The Crescent (8)	Hyders Farm House (9)	Myrtle Cottage (10)	Rowley Farmhouse (11)	Trent House (12)
26 Daytime (16 hour)	51	50	55	54	49	57	58	61	51	62	58	54
26 Night (8 hour)	49	48	53	51	47	54	54	57	50	59	53	49
08 Daytime (16 hour)	57	59	60	57	52	58	54	54	62	63	56	46
08 Night (8 hour)	53	55	56	54	50	55	53	53	59	60	54	45

14.6.20 The predicted levels are modelled for average wind speeds and wind directions during easterly operations and separately during westerly operations (measured in 2018), as detailed in Appendix 14.9.3.

14.6.21 The baseline noise survey was carried out over a 16 day period in August 2016 covering a range of wind speeds and directions. The survey locations were chosen because of their proximity to the airport but ground noise was not the only noise source contributing to the total noise levels that were measured. The measured levels show a range of ambient noise levels at each site due to varying wind and other conditions, and the predicted levels of ground noise fall within these ranges and towards the upper end of the range, confirming the modelling represents a worst case assessment. Appendix 14.9.3 gives further details.

Road Traffic Noise

14.6.22 The baseline NSRs for the study were identified based on their close proximity to the Project and noise sensitivity (see Figure 14.6.10). They include the residential properties nearest to the new or altered road links and the amenity area in the Riverside Garden Park adjacent to the A23 and M23 roads as listed below:

- NSR1 The Crescent East;
- NSR2 The Crescent West;
- NSR3 Woodroyd Gardens;
- NSR4 Cheyne Walk;
- NSR5 Longbridge Road East;
- NSR6 Longbridge Road West;
- NSR7 Povey Cross Road;
- NSR8 Meadowcroft Close
- NSR9 B2036 Balcombe Road;
- NSR10 Riverside Garden Park north;
- NSR11 Riverside Garden Park centre;
- NSR12 Riverside Garden Park south;
- NSR13 First Point office building; and
- NSR14 Premier Inn.

14.6.23 Using initial data from the Vissim traffic model, a noise model was created for the 2018 baseline road traffic to represent the current noise environment due to traffic in the study area and to provide the tool for predicting future baseline and Project noise. The baseline model was calibrated against the Riverside Garden Park measurements that were undertaken by ERM in May 2019, and the baseline measurements carried out for ground noise. Figure 14.6.10 shows the baseline noise modelling results. Detailed results from the model can be found in Appendix 14.9.4.

Future Baseline Conditions

Initial Construction Phase: 2024-2029

14.6.24 For the purposes of the construction noise assessment, the baseline at NSRs around the airport perimeter is dominated by road traffic noise (which is unlikely to change in the near term) and airport ground noise. The baseline during construction (in the short term) is assumed to be as measured in 2016.

First Full Year of Opening: 2029

Air Noise

14.6.25 Baseline air noise modelling has been carried out for the assessment years 2029, 2032, 2038 and 2047 and baseline levels and impacts from the Project are reported in Appendix 14.9.2. A sensitivity analysis was undertaken to assess the likely year of highest air noise impact, ie the greatest change in noise over baseline, and it was found that the greatest air noise impacts are expected in 2032. This chapter therefore provides the results of the baseline and assessment in this worst-case year, with baseline and impacts in the other assessment years (2029, 2038 and 2047) summarised briefly in Section 14.9 when discussing the trends in future noise levels under the Interim Assessment Year 2032 heading, and also reported within Appendix 14.9.2.

Ground Noise

14.6.26 Baseline ground noise predictions have been carried out for the assessment years 2029, 2032 and 2038 but only the worst-case assessment year has been presented within this chapter. The worst case assessment year (highest combination of predicted noise levels and noise change for development scenario) is 2032 and baseline noise predictions for 2029 and 2038 have therefore only been included within Appendix 14.9.3.

Interim Assessment Year: 2032

Air Noise

14.6.27 The 2032 baseline has been modelled based upon air traffic forecasts which include changes in the fleet to quieter types as modelled using the relevant noise emission levels described in Appendix 14.9.2. As described above, a central fleet forecast case and a slower transition fleet case have been modelled to give a range if future baseline conditions.

14.6.28 The air noise baseline in 2032 can be summarised in general terms using the primary noise metrics (described below) in Table 14.6.5.

Table 14.6.5: 2032 (Standard Mode) Air Noise Baseline, Leq Day and Night (1)

Noise Metric	Noise Contour Area (km^2)	Population
$L_{eq,\ 16\ hour}$ day:		
>51 dB	107.3 – 125.8	16,100 – 23,500
>54 dB	54.1 – 67.1	6,700 - 9,100
>57 dB	28.4 – 34.9	1,800 – 2,200
>60 dB	16.6 – 20.3	900 – 1,200
>63 dB	9.2 – 11.5	400 – 500
>66 dB	4.7 – 6.2	200
>69 dB	2.5 – 3.1	100
$L_{eq,\ 8\ hour}$ night:		
>45 dB	141.5 – 143.9	18,800 – 25,400
>48 dB	78.5 – 80.1	8,900 – 10,800

Noise Metric	Noise Contour Area (km^2)	Population
>51 dB	39.3 – 40.3	3,600 – 4,700
>54 dB	21.9 – 22.3	1,000 – 1,300
>55 dB	18.2 – 18.5	900 – 1,100
>57 dB	12.4 – 12.5	500
>60 dB	6.7	300
>63 dB	3.5	200

(1) Ranges cover the central case fleet noise modelling and the slower transition fleet noise modelling.

14.6.29 Figure 14.6.11 shows the 2032 Baseline, $L_{eq,\ 16\ hour}$ day contours. For each noise contour level (51, 54, 57, 60, 63, 66, and 69 dB), contours for the central case fleet and the slower transition fleet noise modelling are plotted with the area between shaded grey to depict the range of contours predicted. The slower transition fleet case is the noisier, forming the outer edge of the shaded range for each noise contour level. The population within the LOAEL $L_{eq,\ 16\ hour}$ day 51 dB contour is approximately 16,100 to 23,500 people, reduced from 24,050 people in 2019. The population within the SOAEL $L_{eq,\ 16\ hour}$ 63 dB contour is approximately 400 to 500 people, reduced from 500 people in 2019 (these estimates are rounded to the nearest 100). This demonstrates the extent to which the airport is expected to become quieter in future. For example, in the central case approximately 100 people fewer with significant effects on health and quality of life from daytime noise are predicted in 2032 than in 2019.

14.6.30 Figure 14.6.12 shows the 2032 Baseline, $L_{eq,\ 8\ hour}$ night contours. The population within the LOAEL $L_{eq,\ 8\ hour}$ night 45 dB contour is approximately 18,800 to 25,400 people, reduced from 27,650 in 2019. The population within the SOAEL $L_{eq,\ 16\ hour}$ 55 dB contour is approximately 900 to 1,100 people, reduced from 1,250 in 2019. This again demonstrates the extent to which the airport is expected to become quieter in future, with, for example in the central case, approximately 350 people fewer with significant effects on health and quality of life from noise at night in 2032 than in 2019.

14.6.31 In addition to the primary L_{eq} noise metrics reported above, the air noise baseline in 2032 can be quantified using the Number Above metrics, N65 day and N60 night, as shown in Table 14.6.6.

Table 14.6.6: 2032 (Standard Mode) Air Noise Baseline, N65 Day and N60 Night (1)

Noise Metric (number of aircraft)	Noise Contour Area (km^2)	Population
N65 day:		
>20	106.2 – 136.4	15,300 – 28,300
>50	75.4 – 89.4	10,900 – 12,900
>100	53.5 – 64.5	6,200 – 7,700
>200	39.6 – 44.3	4,500 – 5,000
>500	3.2 – 3.5	100
N60 night:		
>10	176.4 – 193.0	28,900 – 31,500
>20	112.9 – 121.6	13,700 - 14,700

Noise Metric (number of aircraft)	Noise Contour Area (km^2)	Population
>50	53.2 – 55.3	7,000 – 7,400
>100	2.6 – 2.7	100

(1) Ranges cover the central case fleet noise modelling and the slower transition fleet noise modelling.

14.6.32 Figure 14.6.13 shows the 2032 Baseline N65 day contours. The population exposed to at least 20 aircraft noise events above L_{max} 65 dB on an average summer day is approximately 15,300 to 28,300 in 2032, compared to 24,100 in 2019.

14.6.33 Figure 14.6.14 shows the 2032 Baseline, N60 night contours. The population exposed to at least 10 aircraft noise events above L_{max} 60 dB on an average summer night is approximately 28,900 to 31,500 in 2032, reduced from 33,850 in 2019.

14.6.34 In addition, and to illustrate noise levels over the whole year, annual average Day, Evening Night (L_{den}) and Night (L_{night}) noise levels has also been modelled, consistent with common practice in the European Union and associated regulations. The areas and population within these contours are summarised in Table 14.6.7.

Table 14.6.7: 2032 (Standard Mode) Annual L_{den} and L_{night} Baseline Noise Levels (1)

Noise Metric	Noise Contour Area (km^2)	Population
L_{den}:		
>55 dB	73.1 - 86.5	9,700 – 11,800
>60 dB	24.1 - 29.2	1,400 – 1,800
>65 dB	9.3 - 11.3	400 - 500
>70 dB	3 - 3.8	100 - 200
>75 dB	1.2 - 1.4	0 - 0
L_{night}:		
>45 dB	90.7 - 105.5	11,900 – 14,800
>50 dB	29.5 - 35.5	2,000 – 3,400
>55 dB	11.4 - 13.6	500 - 700
>60 dB	3.8 - 4.7	200 - 200
>65 dB	1.4 - 1.7	0 - 0
>70 dB	0.6 - 0.7	0 - 0

(1) Ranges cover the central case fleet noise modelling and the slower transition fleet noise modelling.

14.6.35 Figure 14.6.15 shows the baseline L_{den} contours in 2032.

14.6.36 Figure 14.6.16 shows the baseline L_{night} contours in 2032.

Ground Noise

14.6.37 The predicted ground noise baseline in 2032 is presented in Table 14.6.8.

Table 14.6.8: Summary of Ground Noise 2032 Future Baseline Predicted Levels (dB L_{Aeq})

Descriptor	Location ($L_{Aeq, T}$ dB)											
	Blue Cedars (1)	3 Charlwood Road (2)	Brook farm (3)	Bear and Bunny Nursery (4)	April Cottage (5)	Oakfield Cottage (6)	103 Cheyne Walk (7)	82 The Crescent (8)	Hyders Farm House (9)	Myrtle Cottage (10)	Rowley Farmhouse (11)	Trent House (12)
2032 – 26 Daytime	45	45	50	50	45	53	54	58	47	57	53	50
2032 – 26 Night	45	44	49	48	43	51	51	54	46	55	50	46
2032 – 08 Daytime	52	55	55	54	49	54	50	50	59	61	51	41
2032 – 08 Night	48	50	51	49	45	51	47	48	56	57	48	39

Road Traffic Noise

14.6.38 Figure 14.6.17 provides road traffic noise contours for the 2032 future baseline (without Project) case. Detailed results are given in Appendix 14.9.4.

Design Year: 2038

Air Noise

14.6.39 Between 2032 and 2038, the fleet would continue to change to quieter types, resulting in further reduction in baseline levels. Full results of modelling primary and secondary noise metrics are provided in Appendix 14.9.2. The following figures show the future baseline noise contours.

- Figure 14.6.18 shows the 2038 Baseline, $L_{eq, 16\ hour}$ day contours.
- Figure 14.6.19 shows the 2038 Baseline, $L_{eq, 8\ hour}$ night contours.
- Figure 14.6.20 shows the 2038 Baseline, N65 day contours.
- Figure 14.6.21 shows the 2038 Baseline, N60 night contours.
- Figure 14.6.22 shows the 2038 Baseline, Lden contours.
- Figure 14.6.23 shows the 2038 Baseline, Lnight contours.

Ground Noise

14.6.40 As discussed above, baseline ground noise predictions for 2038 have not been presented here but are available at Appendix 14.9.3. The ground noise predictions presented in this chapter focus on the worst-case assessment year which is 2032.

Road Traffic Noise

14.6.41 The assessment of significant effects from road traffic noise follows the methodology prescribed in the DMRB which requires future noise to be modelled 15 years after opening, ie in 2047. Future baseline levels of road traffic noise are reported in Section 14.9.

14.7. Key Project Parameters

14.7.1 The assessment has been based on the parameters identified within Chapter 5: Project Description.

14.7.2 Table 14.7.1 below identifies the key parameters relevant to this assessment. Where options exist, the maximum design scenario selected is the one having the potential to result in the greatest effect on an identified receptor or receptor group. Effects of greater adverse significance are not predicted to arise should any other option identified in Chapter 5: Project Description be taken forward in the final design of the Project.

Table 14.7.1: Maximum Design Scenarios (Air Traffic Movements)

Potential Impact	Base Case Scenario	Maximum Design Scenario	Justification
Baseline 2019			
Existing ATMs	16 hour day 766 8 hour night 127	N/A	Base case for assessment.
Initial Construction Phase: 2024-2029			
Construction noise and vibration		Worst case (eg concurrent work, works that may be at night see Appendix 14.9.1).	Ensures that impacts are not under-estimated, so that adequate mitigation is provided for.
First Full Year of Opening: 2029			
Air noise and ground noise ATMs	16 hour day 811 8 hour night 125	16 hour day 848 8 hour night 127	See explanation of assessment years in Chapter 6: Approach to Environmental Assessment and ATM forecast in Chapter 4: Existing Site and Operation and Chapter 5: Project Description.
Interim Assessment Year: 2032			
Air noise and ground noise ATMs	16 hour day 818 8 hour night 125	16 hour day 976 8 hour night 137	See explanation of assessment years in Chapter 6: Approach to Environmental Assessment and ATM forecast in Chapter 4: Existing Site and Operation and Chapter 5: Project Description.
Road traffic noise		Worst case approach is to assess changes in traffic noise in the year of opening of the highway.	As required by DMRB.

Potential Impact	Base Case Scenario	Maximum Design Scenario	Justification
Design Year: 2038			
Air noise and ground noise ATMs	16 hour day 825 8 hour night 124	16 hour day 983 8 hour night 137	See explanation of assessment years in Chapter 6: Approach to Environmental Assessment and ATM forecast in Chapter 4: Existing Site and Operation and Chapter 5: Project Description.
15 Years After Opening: 2047			
Air noise and ground noise ATMs	16 hour day 831 8 hour night 124	16 hour day 988 8 hour night 137	See explanation of assessment years in Chapter 6: Approach to Environmental Assessment and ATM forecast in Chapter 4: Existing Site and Operation and Chapter 5: Project Description.
Road traffic noise		Worst case approach is to assess changes in traffic noise 15 years after the year of opening of the highway. DMRB also requires an assessment of changes between the situation with the Project in 2047 and without the Project in the year of opening (2032).	As required by DMRB to predict highest noise levels 15 years after highway opening.

14.7.3 The construction noise and vibration assessment is based on current understanding of the likely works required to build the Project, as summarised in Chapter 5: Project Description. Key parameters include:

- the plant likely to be used, and hence its noise and vibration emissions;
- the hours of working, night being more sensitive than day (see Appendix 14.9.1);
- location and proximity to NSRs; and
- duration.

14.7.4 At this stage, the exact methods of working have not been defined and therefore, in common with standard practice, where there is uncertainty, a reasonable worst case has been adopted. Appendix 14.9.1 summarises the key works that have been assessed.

14.7.5 For air noise and airport ground noise, the extent of noise impacts would depend largely on the numbers and types of ATMs. These have been forecast and provided for an average summer day and night in the 92 day summer period used in the noise assessments, as summarised in the

table above. Forecasts indicate the runway design capacity would be met in 2038, so this case has been assessed, as noise levels are expected to fall after this. The first full year of year of opening, 2029, has also been assessed. An analysis of the fleet forecast between 2029 and 2038 indicated that 2032 would be the year in which the greatest difference in noise levels with the Project compared to the baseline in that year is likely to arise. So air and ground noise is assessed for 2032 as the likely worst case year. This chapter provides full details of noise levels and expected impacts in 2032, as well as commentary on impacts in these other assessment years, with detail in Appendix 14.9.2.

14.7.6 The Project includes some key changes to the airport (other than increased traffic flow) which affect ground noise impacts. It would be necessary to remove a bund at the western end of the northern runway in order to allow for alterations to taxiways. This bund currently provides mitigation for ground noise affecting properties in the Charlwood area and it would be replaced with a longer (~600 metres) combination of bund and barrier shifted slightly north and west relative to the existing bund. To allow for usage of the northern runway, all taxiing from or to the western end of the runways would take place on Taxiway Juliet, which would have to be moved slightly further north to provide a safe distance between the taxiway and the northern runway in accordance with CAA regulations. In addition, the Project requires an extension to Taxiway Lima, which would join up to Taxiway Juliet providing the main route for all aircraft taxing to or from the western end of the runways. This extension to Taxiway Lima and the planned intensification of usage mean that a large number of taxiing aircraft would be routed further north and west than for previous operations, bringing ground noise sources closer to properties in the direction of Charlwood.

14.7.7 For the road traffic noise assessment, traffic flows for the 2018 base case, and forecasts for the 2029 and 2047 assessment years have been provided by the traffic and transport team, as reported in Chapter 12: Traffic and Transport. Appendix 14.9.4 provides further details.

14.7.8 The overflights analysis contained within the air noise assessment has been used in Chapter 8: Landscape, Townscape and Visual Resources assessment of tranquillity and in Chapter 7: Historic Environment assessment of impacts on sensitive heritage assets. The results of the noise assessment have also been used in Chapter 9: Ecology and Nature Conservation.

14.7.9 WebTAG worksheets for air noise were completed by the CAA to estimate the health impacts and costs associated with the Project. These are provided in Appendix 14.9.2 and have informed the health and socio-economic appraisal, detailed in Chapter 16: Socio-economics. For road traffic noise WebTAG worksheets will also be developed for the ES.

14.8. Mitigation and Enhancement Measures Adopted as Part of the Project

Construction Noise

14.8.1 Construction would be undertaken in accordance with a Code of Construction Practice (CoCP). The CoCP sets out the key management measures that contractors would be required to adopt and implement. These measures would be developed based on those identified during the EIA process. They include strategies and control measures for managing the potential environmental effects of construction and limiting disturbance from construction activities as far as reasonably practicable. An outline CoCP is provided at Appendix 5.3.1.

14.8.2 The outline CoCP forms the basis for the final CoCP and more detailed plans and method statements to be prepared during the pre-construction period, once a Principal Contractor has been appointed.

14.8.3 Specific to noise and vibration, the main mitigation measures likely to be required and set out within the Outline CoCP include the following:

- Best Practicable Means (BPM) as defined by the Control of Pollution Act 1974 (CoPA) and Environmental Protection Act 1990 (EPA), which would be applied during construction activities to minimise noise (including vibration) at neighbouring residential properties and other sensitive receptors[5].
- As part of BPM, mitigation measures would be applied in the following order:
  - noise and vibration control at source: for example, the selection of quiet and low vibration equipment, review of construction methodology to consider quieter methods, location of equipment on-site, control of working hours, the provision of acoustic enclosures and the use of less intrusive alarms, such as broadband vehicle reversing warnings;
  - screening: for example, local screening of equipment or perimeter hoarding or the use of temporary stockpiles; and
  - where, despite the implementation of BPM, the noise exposure exceeds the criteria defined in the outline CoCP, noise insulation or ultimately temporary re-housing would be offered at qualifying properties.
- Lead contractors would seek to obtain prior consent from the relevant local authority under Section 61 of the CoPA for the proposed construction works. The consent application would set out BPM measures to minimise construction noise and vibration, including control of working hours, and provide a further assessment of construction noise and vibration, including confirmation of noise insulation/temporary re-housing provision.
- Contractors would undertake and report monitoring as is necessary to assure and demonstrate compliance with all noise and vibration commitments. Monitoring data would be provided regularly to, and be reviewed by GAL and made available to the local authorities.
- Contractors would be required to comply with the terms of the CoCP and appropriate action would be taken by the nominated undertaker as required to ensure compliance.

14.8.4 Noise insulation would be offered for qualifying buildings, where noise levels exceed defined criteria. Noise insulation or, if other measures are not possible, temporary re-housing would avoid residents being significantly affected by levels of construction noise inside their dwellings. The assessment reported in ES will provide an estimate of the buildings that are likely to qualify for noise insulation or to qualify for temporary rehousing, if any.

14.8.5 Qualification for noise insulation and, where appropriate, temporary re-housing would be confirmed, as part of seeking prior consent from the local authority under Section 61 of the CoPA. Qualifying buildings would be identified, as required in the CoCP, so that noise insulation can be installed, or where appropriate any temporary re-housing provided, before the start of the works predicted to exceed noise insulation or temporary re-housing criteria.

[5] Including local businesses and quiet areas designated by the local authority.

14.8.6 Construction traffic routes have been chosen to avoid routing lorries through villages and past NSRs on minor roads.

Air Noise

Approach to Air Noise Mitigation

14.8.7 From engagement with the local community, Gatwick Airport is aware of the level of concern that aircraft noise might increase as a result of the Project. The Gatwick Airport master plan gave an initial assessment of noise impacts based on preliminary air traffic forecasts and noise modelling carried out at that time. This enabled mitigation to be developed as part of the Project, which has been further developed as part of the EIA process.

14.8.8 The ICAO balanced approach to mitigation (see Section 14.2) consists of four main elements:

- noise at source;
- land use planning;
- operating procedures; and
- operating restrictions.

14.8.9 Gatwick Airport has a comprehensive noise management system that follows this approach, as reported in the Noise Action Plan that is updated by GAL and reviewed by DfT every five years. Section 4 of Appendix 14.9.2 provides a summary of the main noise mitigation activities that will continue as part of Gatwick's ongoing noise management programme as the Project is developed and into the future. The following text focuses on some of the noise mitigation measures that are most relevant to the Project.

Air Noise Mitigation at Source

14.8.10 Aircraft noise is generated by a number of different 'sources'. Though the dominant one is still the engines, on approach airframe noise is now becoming important. Through the work of ICAO and the development of the aircraft chapter standards, the industry has invested heavily in research and development to continually reduce the noise impact of aviation. The way in which aircraft noise levels are measured and reported is described in more detail in Appendix 14.9.2 Section 4.

14.8.11 GAL operates a system of aircraft movement charges that are based on each aircraft's noise levels measured under ICAO certification processes. Each type of aircraft is placed in to one of five noise categories according to the margin by which it is quieter than the ICAO Chapter 3 Standard that was defined in 1977. These movement charges for the 2021 summer season are given in Table 14.8.1. Winter season changes are lower and do not include day charges, with the exception of Fuel Over Pressure Protector (FOPP) charges (see below).

14.8.12 In certain flight configurations the Airbus A320 family of aircraft is known to produce a high-pitched whine, generated by the FOPP cavities under the wings. A modification to the FOPP is available that eliminates this characteristic whine. In recognition of this, any Airbus A320 Family aircraft not declared as having the FOPP modification is subject to a higher unmodified A320 family noise charge. This is intended to incentivise airlines to carry out the low-cost modification required to eliminate the specific noise disturbance associated with unmodified A320 family aircraft.

Table 14.8.1: Gatwick Airport 2021 Summer Season Movement Charges

Noise Category	Chapter 3 Margin dB	Day Charge £	Night Charge £
Chapter 14 Minus	>=23	£17.45	£458.25
Chapter 14 Base	20 to 23	£21.82	£572.80
Chapter 14 High	17 to 20	£26.19	£687.37
Chapter 4	10 to 17	£43.65	£1,145.62
Chapter 3 and below	<=10	£87.28	£2,291.25
Unmodified A320 Family		£872.85	£2,291.25

14.8.13 The ICAO certification process gives noise levels measured at three locations, and the Chapter 3 margins are for the summation of these three noise levels. Thus a margin of 20 dB does not imply a noise level measured on the ground 20 dB lower, rather about 1/3 of this, or around 7 dB lower.

14.8.14 The higher landing charges for noisier aircraft are intended to incentivise airlines to operate quieter aircraft at Gatwick, especially at night. GAL regularly reviews these charges so that operators with noisier aircraft are incentivised further to re-equip with quieter types.

Land Use Planning

14.8.15 Land use planning is largely the responsibility of local planning authorities. However, Gatwick Airport works with local authorities and provides noise exposure information to assist them. The noise modelling forecasts provided in this PEIR will provide further information to assist local authorities in fulfilling their role in avoiding new housing being built in unsuitably noisy locations without suitable noise insulation provided in their design.

14.8.16 Guidance to planners and house builders is provided in Planning and Noise (Association of Noise Consultants *et al.,* 2017). Gatwick Airport will continue to liaise with planning authorities to help ensure land use planning is used to avoid unsuitable noise sensitive development in the relevant noise zones.

14.8.17 The Noise Management Board has included in its work plan a project to work with local authorities to help improve land use planning with regards noise sensitive developments affected by noise from the airport. (See https://www.gatwickairport.com/business-community/aircraft-noise-airspace/engagement/noise-management-board/ for more details of the Noise Management Board and its work plan).

Air Noise Operating Procedures

14.8.18 The Project does not require new flight paths; this would avoid the noise impacts that can be associated with new flight paths. Only departures would use the northern runway, except during maintenance as is currently the case. The majority of these would be above 1,000 feet before they leave the airfield.

14.8.19 At this stage, the noise modelling has assumed that use of the northern runway would be limited to the period 06:00-23:00 hours, avoiding scheduling flights in the majority of the more sensitive night-time period.

14.8.20 GAL would operate flights from the northern runway using procedures designed to minimise noise impacts, compliant with established noise abatement procedures and in line with the commitments of the Noise Action Plan. The Noise Action Plan lays out a series of actions to manage and reduce noise which equally apply to flights using the northern runway. GAL would continue to work with stakeholders to develop ways to minimise noise for all operations at the airport.

14.8.21 GAL operates a system of Departure Noise Limits in which all aircraft leaving the airport are measured at a set of locations about 3 km from the airport, and airlines are fined if they exceed defined noise limits as follows:

- Day (07:00-23:00 hour) L_{max} 94 dB
- Shoulder (23:00- 23:30 and 06:00-07:00 hours) L_{max} 89 dB; and
- Night (23:00 to 06:00 hours) L_{max} 87 dB.

14.8.22 Departure noise limits are the responsibility of the DfT and have applied at Gatwick since 1968, and were last reduced in 2001.

14.8.23 Airlines are fined £500 if their aircraft exceed these limits by up to 3 dB, and £1000 if they exceed by more than 3 dB. Monies from fines are passed to the Gatwick Airport Community Trust.

14.8.24 Departure noise limits are intended to incentivise good operational procedures on departure, ie flying a given aircraft as quietly as possible. In 2021 GAL carried out a review of compliance with these limits that showed only about three infringements of the limits since 2017. The lack of infringement is strong evidence of the improvements in aircraft technology since 2001. GAL proposes to review the present limits and fines to recalibrate for modern aircraft performance capabilities and incentivise continued reductions of noise at source.

14.8.25 In paragraph 3.119 of the consultation document for the Aviation Strategy (Department for Transport, 2018b), the government stated it wished to… *'define better targeted maximum departure noise limits which incentivise quietest performance across different aircraft types rather than a 'one size fits all' limit'*.

14.8.26 One way to reduce the departure noise limits would be to simply lower the three noise limits for the day, shoulder and night periods. However, this would increase the number of noise infringements for the larger noisier aircraft and create little incentive for the smaller aircraft to improve their operating procedures. Instead the current proposal (independent of this Project) is to set departure noise limits for three categories of aircraft grouped according to their noise Quota Count[6] (QC) so as to incentivise good operational practice across all aircraft, not just the noisiest. The proposed aircraft Categories and noise limits are as follows:

- Category A – QC 0 to 0.125 – L_{max} 80 dB;
- Category B – QC 0.25 to 0.5 L_{max} 83 dB; and
- Category C – QC 1 and above 2 L_{max} 86 dB.

14.8.27 It is estimated that up to around 100 aircraft a year would need to reduce departure noise in order to avoid breaching these limits. The current proposal is for the fines that GAL apply to be set

[6] Under the Quota Count system each aircraft is given a QC that relates to its noise levels measured when the aircraft was certificated for air worthiness.

higher during the more sensitive night period and for the noisier categories, so as to provide greater incentives but not at levels that would restrict airlines from operating.

14.8.28 GAL is engaging with airlines and considering the administration of a revised system, as outlined above, and seeks views from consultees on these proposals. The proposed review is independent of the Project and would proceed in its absence (and so would form part of the future baseline).

Noise Insulation Scheme

14.8.29 Since 2014, noise policy and the need for mitigation has been tested in the following successful applications for new airport infrastructure:

- Birmingham International Airport Runway Extension, 2014;
- London City Airport Development Plan, 2015-2016;
- Cranford Agreement Secretary of State's Decision, February 2017 (DCLG, 2017); and
- Stansted Airport Planning Application and Appeal Decision, May 2021.

14.8.30 The main mitigation measure relied upon for homes affected by high noise levels was noise insulation. In the Birmingham case, properties above L_{eq} 63 dB were offered noise insulation, consistent with the Aviation Policy Framework, NPPF and NPSE requirement to 'avoid' significant adverse effects above SOAEL. Transport infrastructure projects (eg HS2) have used noise insulation as a mitigation measure where necessary to comply with the 'avoid' requirement, and this has been accepted by the relevant authorities[7].

14.8.31 The current Government consultation document Aviation 2050 (Department for Transport, 2018b) proposes improvements to noise insulation schemes as follows:

'3.121 The government is also:

- *proposing new measures to improve noise insulation schemes for existing properties, particularly where noise exposure may increase in the short term or to mitigate against sleep disturbance.*

3.122 Such schemes, while imposing costs on the industry, are an important element in giving impacted communities a fair deal. The government therefore proposes the following noise insulation measures:

- *to extend the noise insulation policy threshold beyond the current 63 dB $L_{Aeq, 16\ hour}$ contour to 60 dB $L_{Aeq, 16\ hour}$;*
- *to require all airports to review the effectiveness of existing schemes. This should include how effective the insulation is and whether other factors (such as ventilation) need to be considered, and also whether levels of contributions are affecting take-up;*
- *the government or ICCAN to issue new guidance to airports on best practice for noise insulation schemes, to improve consistency;*

[7] See also Cranford Appeal report, §1087 *"Against this background I consider that the proffered mitigation between SOAEL and UAEL* [Unacceptable Effects Level of 69dBALeq] *is consistent with the APF and would be sufficient to avoid significant observed adverse effects."*

- *for airspace changes which lead to significantly increased overflight, to set a new minimum threshold of an increase of 3 dB L_{Aeq}, which leaves a household in the 54 dB $L_{Aeq, 16\ hour}$ contour or above as a new eligibility criterion for assistance with noise insulation.'*

14.8.32 The recent planning application for Stansted Airport included a three tier noise insulation scheme offering the greatest level of noise insulation for properties above $L_{Aeq\ 16\ hr}$ 66 dB, a mid level of protection in the range $L_{Aeq\ 16\ hr}$ 60 to 63 dB and a lower level of insulation package above $L_{Aeq\ 16\ hr}$ 57 dB.

14.8.33 The current Gatwick NIS is based on a 60 dB L_{eq} contour. The extent of the scheme is shown as the red line in Figure 14.8.1. It is based on a future Leq, 16 hour 60 dB contour forecast in 2014, with 15 km extensions from under the runway centrelines, and adjusted to accommodate various residential areas. There are about 2,000 homes within this area of which about 1,090 have taken up the scheme. Within this zone residents are entitled to £3,000 towards acoustic glazing and doors. Under the existing Noise Action Plan commitments, GAL is reviewing the scheme, which is expected to result in an enhanced offer within the same zone.

14.8.34 An enhanced NIS would be introduced for the Project to replace the current scheme and to address expected increases in air noise, and to offer additional mitigation for the housing already worst affected by noise, comprising two zones.

- Inner Zone.
- Outer Zone.

14.8.35 A new NIS Inner Zone would offer the highest level of noise insulation sufficient to avoid noise levels above the SOAEL ($L_{eq, 16\ hour}$ 63 dB and $L_{eq, 8\ hour}$ 55 dB). The highest noise levels forecasts, for 2032, predict the following dimensions to these contours for the slower transition fleet case:

- $L_{eq, 16\ hour}$ day 63 dB: 13.9 km^2, approx. 600 people, 250 households; and
- $L_{eq, 8\ hour}$ night 55 dB: 20.7 km^2, approx.1,200 people, 450 households.

14.8.36 The NIS Inner Zone is formed by the larger of these, the $L_{eq, 8\ hour}$ night 55 dB contour, which fully encloses the $L_{eq, 16\ hour}$ day 63 dB contour. The NIS Inner Zone is shown as the black contour line in Figure 14.8.1 for the slower transition fleet case. Residential properties within this zone would be offered noise insulation in the form of replacement acoustic glazing or internal secondary glazing to all windows, acoustic ventilators and blinds to noise sensitive rooms (bedrooms, sitting rooms, dining rooms and studies), and replacement doors to noise sensitive rooms if necessary. Additionally, the offer would include acoustic upgrading of bedroom ceilings where practicable if they are found to be allowing more noise intrusion than the closed acoustic glazing provided. Overall properties in this new Inner Zone would receive a significantly improved level of noise mitigation.

14.8.37 A new NIS Outer Zone would be created for homes within the forecast $L_{eq, 16\ hour}$ 54 dB daytime noise contour in 2032. This noise level was chosen in view of the Government consultation document Aviation 2050 (Department for Transport, 2018b) and best practice at UK airports. The new Outer Zone is shown in blue in Figure 14.8.1. This zone would be extended where necessary (eg along the extended runway centreline to the west) to ensure it includes all properties within the current scheme, as shown in Figure 14.8.1. Approximately 3,300 homes are predicted to be within this zone and outside the Inner Zone. In this zone noise levels are modelled below SOAEL and residents would be offered acoustic ventilators to noise sensitive rooms. This would allow

windows to remain closed with ventilation, which, with modern double glazed windows, would increase the sound attenuation of the window by more than 10 dB. For properties with older single glazed windows with poor acoustic performance, double glazed windows would be offered to noise sensitive rooms in addition to ventilators to ensure equivalent levels of protection.

14.8.38 A schools NIS is proposed for all schools with noise sensitive teaching spaces within the forecast 2032 $L_{eq,\ 16\ hour}$ 51 dB noise contour. Where schools are concerned that aircraft noise could be affecting teaching, each classroom area would be surveyed to assess the effects of all types of noise including local road traffic. If noise insulation measures, such as improved glazing and acoustic air ventilation, would be practicable to implement, and would have the potential to significantly improve the overall teaching conditions, then GAL would work with the school to deliver a suitable noise insulation package.

Home Owners Assisted Moving Scheme

14.8.39 In order to offer home owners the option to move from the areas most affected by the highest noise levels, home owners newly within the $L_{eq,\ 16\ hour}$ 66 dB noise contour as a result of the Project coming into operation would be offered a package to assist them in moving.

Monitoring Performance

14.8.40 Gatwick Airport reports its air noise management performance through a number of mechanisms including:

- quarterly and annual Flight Performance Team (FPT) reports that provide information on performance against noise control measures;
- live online NTK; and
- annual Noise Contour Reports.

14.8.41 In addition to the above reporting, Gatwick Airport also regularly engages with stakeholders including airlines, air navigation service providers, local community groups, local authorities, ICCAN and Government bodies. This is done through various engagement forums such as the:

- Gatwick Airport Consultative Committee (GATCOM);
- GATCOM Steering Group;
- Noise and Track Monitoring Advisory Group (NaTMAG);
- Noise Management Board;
- Section 106 Steering Group; and
- The Gatwick Noise Monitoring Group.

14.8.42 Consultation with community noise groups through the Noise Management Board since 2017 has shown that those residents most affected by noise are keen to see not just monitoring of past or current performance but also forecasts of noise exposure in the near future. Community noise groups want certainty in how noise would change in the near term. There is good evidence, from the SONA study, that residents expecting an airport to become noisier in the future are more annoyed by the noise than those who expect it to become quieter. The research found that this expectation factor (referred to as a confounding factor) alone can change the proportion of a population highly annoyed by 30-50%. Working with community noise groups Gatwick Airport agreed to develop a process by which the noise change associated with the growth of the airport could be forecast for the coming years, and reported, to help manage the expectations of local

residents, and to forecast future noise management performance. The Project would take forward this process as described in the next section.

Noise Envelope

14.8.43 This section summarises the options considered and the noise envelope proposed for the Project. Appendix 14.9.5 provides further details of the options considered and how the proposed envelope has been developed within the ICAO balanced approach as required under EU Regulation No 598/2014, as adopted in UK law.

14.8.44 The Airports NPS (paragraph 5.60) requires Heathrow to put forward a 'noise envelope' for its third runway proposal:

'Such an envelope should be tailored to local priorities and include clear noise performance targets. As such, the design of the envelope should be defined in consultation with local communities and relevant stakeholders and take account of any independent guidance such as from the Independent Commission on Civil Aviation Noise. The benefits of future technological improvements should be shared between the applicant and its local communities, hence helping to achieve a balance between growth and noise reduction. Suitable review periods should be set in consultation with the parties mentioned above to ensure the noise envelope's framework remains relevant.'

14.8.45 In its Scoping Opinion for the Gatwick Northern Runway Project, the Planning Inspectorate stated:

'The Inspectorate notes that there is no reference to a defined 'noise envelope' as referred to in paragraph 5.60 of the Airports NPS, and the Applicant should make efforts to agree the need for such provisions with relevant consultation bodies as a mechanism to manage noise effects.'

14.8.46 CAP 1129 Noise Envelopes (CAA, 2013) gives guidance as to the forms that noise envelopes can take, and how they can be implemented. Appendix 14.9.5 discusses each of these options and its merits for this Project. This section briefly summarises the options available and describes the preferred options and the noise envelope that GAL proposes as most appropriate for the Project.

14.8.47 Noise envelopes for airports, as with noise conditions attached to planning consents for other types of noise generating development, can either restrict 'inputs' (eg numbers of flights) or noise 'impacts' in some way. Night restrictions are an example of a noise envelope already in place that restricts inputs. In their case, the restrictions relate to numbers of night flights and total quota counts (QCs) of night flights, in the summer and winter seasons. Noise envelopes that restrict or limit inputs have the advantage of being relatively easy to predict and administer, but they do not give a direct measure or limit on the noise impact experienced in the communities around the airport. Neither do they provide any incentive for the airport or airlines to bring forward quieter operating procedures.

14.8.48 Noise envelopes that restrict noise impacts can be set in terms of the extent of noise effects eg Schiphol Airport has limits of populations highly annoyed and populations sleep disturbed.

However, these rely on applying dose/response relationships for the effects, which can generate uncertainty.

14.8.49 More commonly, noise envelopes that restrict noise impacts use noise contours to either limit the area of the contour or the population within it. The choice of noise contour metric should reflect the impact. $L_{eq,\ 16\ hour}$ day or $L_{eq,\ 8\ hour}$ night contours are the most common contours used because their relationships to annoyance and sleep disturbance in the UK are well understood. Noise event metrics such as L_{max} are less effective, because, taking no allowance for numbers of noise events, they are not good indicators of health effects when used in isolation, and provide no certainty on the numbers of events.

14.8.50 Setting a noise envelope in terms of the population within a given noise contour, such as $L_{eq,\ 16\ hour}$ day or $L_{eq,\ 8\ hour}$ night, has the advantage that it directly relates to the noise impact on the community. However, the population within the area around Gatwick is not within the airport's control and a contour set on this basis could not be monitored or applied with any certainty.

14.8.51 Using the physical size of the $L_{eq,\ 16\ hour}$ day or $L_{eq,\ 8\ hour}$ night contours is therefore considered to be the most appropriate option. A contour which fixes the maximum noise footprint of the airport would limit the throughput of the airport, unless quieter planes can be encouraged to operate. It would incentivise the airport to encourage airlines to use the quietest aircraft and quietest operating procedures, whilst allowing growth to occur within a clear noise limit. It would also provide local communities with certainty on future noise levels.

14.8.52 GAL proposes a noise envelope, therefore, that sets limits in terms of the areas of the daytime LOAEL contour $L_{eq,\ 16\ hour}$ day 51 dB, and the night-time LOAEL contour $L_{eq,\ 8\ hour}$ night 45 dB. The LOAEL contours have been chosen because they represent the lowest level of observable adverse effects during the day and night.

14.8.53 The limiting $L_{eq,\ 16\ hour}$ day and $L_{eq,\ 8\ hour}$ night contour areas are proposed with reference to the forecast noise impacts reported in this PEIR, taking account of operating and other measures to limit noise[8].

14.8.54 The noise assessment reporting in this chapter has reported the most likely noise impacts based on the central case fleet ATM forecasts, as discussed in Section 14.5. This is considered the most likely rate of fleet transition based on current assumptions regarding the airlines' fleet procurement programmes and business models. The noise assessment in this chapter also reports the noise impacts associated with a slower transition fleet that supposes the rate of fleet transition is delayed by about five years, particularly owing to uncertainties due to Covid. Whilst the central case fleet is considered most likely to occur, the slower transition fleet could still occur and therefore the noise envelope proposed is based on the noise modelling of this fleet. Appendix 14.9.5 discusses details of the slower transition fleet and the propositions of the quieter next generation aircraft that it expects in the future years used in the noise assessment. The slower transition fleet still builds in assumptions that the noisiest aircraft currently flying at Gatwick are phased out by the point the northern runway opens and that substantial investment in next generation aircraft will occur. For example, in 2019, around 2% of the Gatwick fleet did not meet the ICAO Chapter 4 noise standard, however, these aircraft produce the highest individual

[8] This is consistent with the approach approved by the Planning Inspectors for the Stansted planning application appeal (ref: APP/C1570/W/20/3256619) in May 2021), which consented the expansion of the airport with planning conditions that included limits on the areas of the $L_{eq,\ 16\ hour}$ day and $L_{eq,\ 8\ hour}$ night contour areas (albeit at higher noise levels of $L_{eq,\ 16\ hour}$ day 54 dB, and $L_{eq,\ 8\ hour}$ night 48 dB) based on the forecasts used in the Environmental Statement that accompanied the application.

noise levels and make a disproportionate contribution to the contour areas. Therefore, the expected removal by airlines of a proportion of these aircraft will deliver a significant improvement in the noise environment.

14.8.55 The noise assessment has considered noise levels from the Project in 2029, 2032, 2038 and 2047 and demonstrated that for the central case the day and night noise contour areas would decrease relative to the 2019 airport in all successive assessment years with the Project. The effect of the Project on opening in 2029 is to increase the noise levels relative to the future baseline, with maximum contour areas about three years later in 2032, before dropping slightly in 2038, the design year for the runway, when 382,000 commercial ATMs/year would be operating. GAL proposes to set the noise envelope to limit noise levels between opening of the northern runway and the peak noise year and then to set a lower noise envelope limit to provide certainty that noise levels would reduce when the runway design throughput of 382,000 ATMs/year is reached and beyond.

14.8.56 Regulation EU 598/2014 seeks to ensure that 'noise related operating restrictions' are only imposed when other measures within the balanced approach have first been considered, and where those other measures are not in themselves sufficient to attain the specific noise abatement objectives for the airport. The proposed noise envelope has been assumed to be a noise related operating restriction under the Regulation.

14.8.57 GAL propose the following noise objective for the Project:

- The Project will:
  - avoid significant adverse impacts on health and quality of life from noise;
  - mitigate and minimise adverse impacts on health and quality of life from noise;
  - where possible, contribute to improvements to health and quality of life; and
  - provide certainty to the communities around Gatwick that noise will not exceed contour limits and will reduce over time,

  consistent with the ICAO Balanced Approach.

14.8.58 Appendix 14.9.5 gives further details on the application of Regulation EU 598/2014. The proposed noise envelope limits are as set out below.

14.8.59 By the end of the first year after opening of the reconfigured northern runway pursuant to the Project, and thereafter, the area enclosed by the 92 day summer season average mode noise contours produced by the CAA shall not exceed the following:

- $L_{eq\ 16\ hour}$ day 51 dB: 146.7 km^2; and
- $L_{eq\ 8\ hour}$ night 45 dB: 157.4 km^2.

14.8.60 By the end of the first year in which annual commercial ATMs exceed 382,000, and thereafter, the area enclosed by the 92 day summer season average mode noise contours produced by the CAA shall not exceed the following:

- $L_{eq\ 16\ hour}$ day 51 dB: 125.7 km^2; and
- $L_{eq\ 8\ hour}$ night 45 dB: 136.1 km^2.

14.8.61 The area of the L_{eq} day and night contours would not exceed the limits above, and the noise envelope would provide certainty to the community that noise levels would be limited and would

reduce in the future as the airport grows so as to share the benefits of that growth and new technologies with the community.

14.8.62 GAL will report on performance within the noise envelope annually and set in place internal management processes to forecast performance in the years ahead so as to pre-empt potential non-compliance and put in place operating practices and measures to reduce noise before an exceedance arises. Such measures would be subject to consultation with industry and community stakeholders if they trigger the requirements of Regulation (EU) 598/2014.

14.8.63 GAL seeks views from stakeholders on the proposed noise envelope for consideration as part of this consultation.

Ground Noise

14.8.64 Mitigation is proposed as part of the Project on the airport boundary where practicable to do so, as a combination of new earthwork bunding and acoustic barriers. These would be provided to the west of the airfield where changes in the taxiway infrastructure would be affected as a result of the Project. Additionally, very large buildings, such as the Boeing Hangar and new buildings proposed would themselves act as noise barriers.

14.8.65 At night when there are less aircraft it would be possible to adopt different taxi-routings to reduce taxiing closest to residential areas to the west.

14.8.66 The measures that have been designed into the Project to reduce the potential for impacts on sensitive receptors affected by aircraft ground noise are listed in Table 14.8.2.

Table 14.8.2: Mitigation and Enhancement Measures – Ground Noise

Measures Adopted as Part of the Project	Justification
Mitigation*	
Earthworks, bunding at least 8 metres in height situated at the western end of northern runway.	Required to screen noise close to the source to reduce noise outside the airport. Necessary to replace functionality of existing bund that would be removed as part of the design.
Noise barriers 10 metres in height adjoining the bund installed at the western end of the northern runway and running for approximately 500 metres just to the north of the relocated Juliet taxiway.	Required to screen noise close to the source to reduce noise outside the airport. Necessary to replace functionality of existing bund that would be removed as part of the design and to hopefully improve on the functionality where possible.

* It should be noted that all mitigation measures listed in this table are included in the prediction model, they are not separate alternative options

Road Traffic Noise

14.8.67 A number of measures have been designed into the Project to reduce the potential for impacts from traffic noise. These are listed in Table 14.8.3.

Table 14.8.3: Mitigation and Enhancement Measures – Road Traffic Noise

Measures Adopted as Part of the Project	Justification
Mitigation	
2 metre noise barrier stretching along the A23 on the edge of Riverside Garden Park.	Mitigation can be built into the design of the new roundabouts and surrounding roads, given the high existing noise levels in the Riverside Park and surrounding residential area, to address the third aim of the NPSE to reduce adverse effect of noise where opportunities arise.
1 metre noise barrier along the North Terminal roundabout flyover elevated section (facing Riverside Garden Park).	
1 metre noise barrier along the South Terminal roundabout flyover elevated section, north side.	

14.8.68 A low noise surface may be provided by the Project, but may also be provided in the do-minimum case. The possible benefit of this has therefore been omitted from the assessment of the Project, as a worst case. Also, given the relatively low speed of the road traffic, the noise reduction would be lower than would be the case on high speed roads.

14.9. Assessment of Effects

Initial Construction Phase: 2024-2029

Construction Noise

14.9.1 Construction noise has been modelled based on a series of worst case simplifying assumptions as reported in Section 14.5. The 73 main construction works areas modelled are listed in Appendix 14.9.1 with their currently expected hours of working: day; evening; or night. At this stage the programme of works has allowed the main construction works areas to be grouped into 13 periods: the 12 individual years between 2024 and 2035 and the period 2036 to 2038. In order to not under-estimate the possible combined noise levels and effects of overlapping works, all works likely to occur within any of these periods have been modelled concurrently, resulting in 13 noise models. The results of this initial worst case noise modelling are given in Appendix 14.9.1. This section discusses the works related to the main airfield areas, and the surface access (highway improvements) works which take place from 2024 to 2029 based on current program information.

14.9.2 The initial construction phase noise modelling indicates that there is potential for adverse noise impacts in the communities bordering the airport, and that the scale of those impacts is likely to be larger at night, reflecting the current expectation that much of the work would need to be carried out at night. The significance of the effects on all communities will be further assessed in detail in the ES, based on the construction programme, duration of each main works, better knowledge of the plant likely to be used and further consideration of noise mitigation measures available to reduce noise levels on site. It is expected that noise mitigation would be identified to reduce noise levels, including quieter methods of working, reducing plant noise levels for night works near sensitive areas, site perimeter noise barriers and receptor-based mitigation where appropriate (noise insulation and temporary rehousing). Based on the available information, and the likely extent of mitigation that would be available, residual noise effects are likely and the magnitude of noise impact from construction is assessed as medium magnitude, which would give rise to a **moderate adverse** effect which may be considered significant, in some areas.

14.9.3 The construction noise assessment will be refined in the ES in order to develop further mitigation on site and to estimate the likely extent of the construction noise insulation scheme that would be required in accordance with the CoCP to ensure significant adverse effects on health and quality of life are avoided.

14.9.4 It is important to note that this assessment is worst case, based on a series of cautious assumptions, in order to provide an indication of the potential scale of adverse effects at this stage. The noise modelling will be refined as more details of some construction works become available for the ES, in particular to consider mitigation of noise levels on site.

14.9.5 Potential for vibration impacts will also be assessed in the ES including the likely need for percussive piling at the South Terminal roundabout.

Road Traffic Noise

14.9.6 Construction traffic on public highways has the potential to create noise disturbance. The extent of noise impact would depend on the numbers of NSRs along the relevant routes, and the extent to which noise levels on routes is increased, which depends on the numbers of construction vehicles compared to base flows during the day and night. The three main routes to be adopted by construction traffic are from the M23 Junction 9 into the main construction compounds on the airfield and next to the South Terminal roundabout. They pass along the following routes:

- M23 and A23 – highly trafficked roads with generally few nearby NSRs;
- Perimeter Road East – inside the airport with few nearby NSRs;
- Longbridge Way and Perimeter Road North – inside the airport with few nearby NSRs; and
- Larkins Road, inside the airport with no nearby NSRs.

14.9.7 The route for construction traffic from Junction 10 of the M23 passes along the following roads:

- A2011 dual carriageway – highly trafficked road with generally few nearby NSRs;
- along Gatwick Road from the Hazelwick Roundabout – busy roads though commercial areas of Crawley past few NSRs; and
- into the airport from the Gatwick Road roundabout.

14.9.8 It is not proposed to route construction traffic on smaller roads or through villages such as Charlwood. This would avoid direct noise impacts from construction traffic in these areas. However, there would be construction traffic at night to support the night work, and during highways works, usual road traffic may choose to divert to other routes which may increase noise levels elsewhere. To assess the significance of these potential effects, modelling of construction traffic noise during peak airfield and peak highways works will be undertaken and reported in the ES.

First Full Year of Opening: 2029

Construction Noise

14.9.9 Construction noise has the potential to create noise disturbance in 2029 and up to 2038 when the final works would be complete. This section summarises the likely construction noise impacts from 2029 to 2038, based on current program information. It also summarises impacts expected over the entire construction period.

14.9.10 The construction phase noise modelling indicates that there is potential for adverse noise impacts in the communities bordering the airport in 2029 and beyond, and that the scale of those impacts is likely to be larger at night, reflecting the current expectation that work would be required to be carried out at night. The results are summarised in Appendix 14.9.1 and indicate that in total across all the works, there is potential for adverse noise effects at approximately 150 properties during the day and approximately 500 during the night. The area of greatest potential impact is in Horley due to night works required for the highway alterations, mainly over the period 2029 to 2032. The significance of the effects on all communities will be assessed in detail in the ES, based on the construction programme, duration of each main works, better knowledge of the plant likely to be used and consideration of noise mitigation measures available to reduce noise levels on site. It is expected that noise mitigation would be identified to reduce noise levels, including quieter methods of working, reducing plant noise levels for night works near sensitive areas, and site perimeter noise barriers and receptor-based mitigation where appropriate (noise insulation and temporary rehousing). Based on the currently available information, and the likely extent of mitigation that would be available, residual noise effects are likely and the magnitude of noise impact from construction is assessed as medium magnitude, which would give rise to a **moderate adverse** effect which may be considered significant, in some areas.

14.9.11 Initial predictions show that making a conservative assumption regarding the effect of additional mitigation, the numbers of households affected would be substantially reduced as shown in Appendix 14.9.1. The residual noise effects that are likely are mainly predicted at residential properties in Horley which are close to highway works where works at night are required. The construction noise assessment will be refined in the ES in order to develop further mitigation on site and to estimate the likely extent of the construction noise insulation scheme that would be required in accordance with the CoCP to ensure significant adverse effects on health and quality of life are avoided.

14.9.12 It is important to note that this assessment is based on a series of cautious assumptions, in order to provide an indication of the potential scale of adverse effects at this stage. The noise modelling will be refined as more details of the construction works and programme become available for the ES.

14.9.13 Potential for vibration impacts will also be assessed in the ES including the likely need for percussive piling at the South Terminal roundabout.

Air Noise

14.9.14 The results of modelling air noise levels in the 2029 base and 2029 ‘with Project’ cases are presented in Section 4 of Appendix 14.9.2. The northern runway is anticipated to add approximately 40 additional movements in the summer daytime period and 2 additional movements at night. By 2032 the northern runway is anticipated to add approximately 160 additional movements in the summer daytime period and 10 additional movements at night. The impacts predicted in 2029 are lower than in those predicted for 2032, as discussed in the following Interim Assessment Year section (2032).

Ground Noise

14.9.15 The results of modelling of predicted ground noise for the Project in the first year of opening (2029) and the associated assessment of effects are presented in Appendix 14.9.3. The changes between future baseline and with Project predicted noise levels in 2029 are smaller than in 2032

because the use of the northern runway is expected to increase between 2029 and 2032. The assessment therefore focuses on the 2032 assessment year as a worst-case (see section on 2032 effects). Appendix 14.9.3 includes information on the noise emissions levels from current and next generation aircraft used for the ground noise modelling.

Road Traffic Noise

14.9.16 Construction traffic on public highways has the potential to create noise disturbance and would continue into 2029. The potential for noise impacts from this source has been considered in the assessment for the initial construction phase: 2024-2029.

14.9.17 It is also acknowledged that there would be operational traffic associated with the Project during 2029. This will be assessed at the ES stage.

Interim Assessment Year: 2032

Air Noise

14.9.18 As discussed in Section 14.4, the assessment of air noise uses a number of noise metrics to quantify the noise changes expected from the Project, as reported in the following sections.

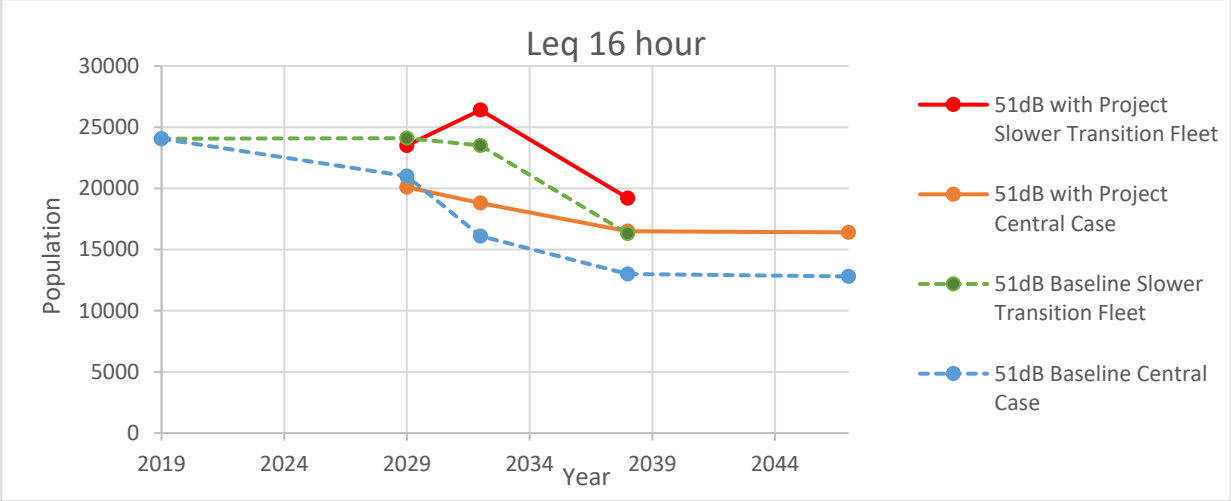
- Primary noise metrics – $L_{eq,\ 16\ hour}$ day and $L_{eq,\ 8\ hour}$ night contours are used to quantify changes in community noise exposure in terms of populations affected and areas of noise contours, and likely significant effects on health and quality of life. $L_{eq,\ 16\ hour}$ day and $L_{eq,\ 8\ hour}$ night difference contours are used to show noise changes across the area.
- Secondary Noise metrics – N65 day and N60 night contours are used to quantify changes in community noise exposure measured in terms of the numbers of noise events (above L_{max} 65 dB and L_{max} 60 dB) as populations affected and areas of noise contours.
- L_{den} and L_{night} annual average noise contours are provided to illustrate noise changes over the entire year.
- Community Representative Locations – Noise levels in terms of primary and secondary noise metrics at these particular locations are used to describe in more detail how noise would change in terms of changes in L_{eq} decibel levels and number of flights above L_{max} 60 and L_{max} 65 dB on average summer easterly and westerly operating days.
- L_{max} 60 and 65 dB – footprints from a common aircraft type are plotted to illustrate how L_{max} levels would change for departures from the northern runway compared to the main runway.
- Noise Sensitive Buildings – noise levels at schools, hospitals, places of worship and community buildings are considered to assess impacts on these non-residential noise sensitive buildings.
- Overflights – change in the numbers of overflights expected within a wider area up to 35 miles from the airport are estimated to inform those experiencing aircraft in the sky further from the airport.

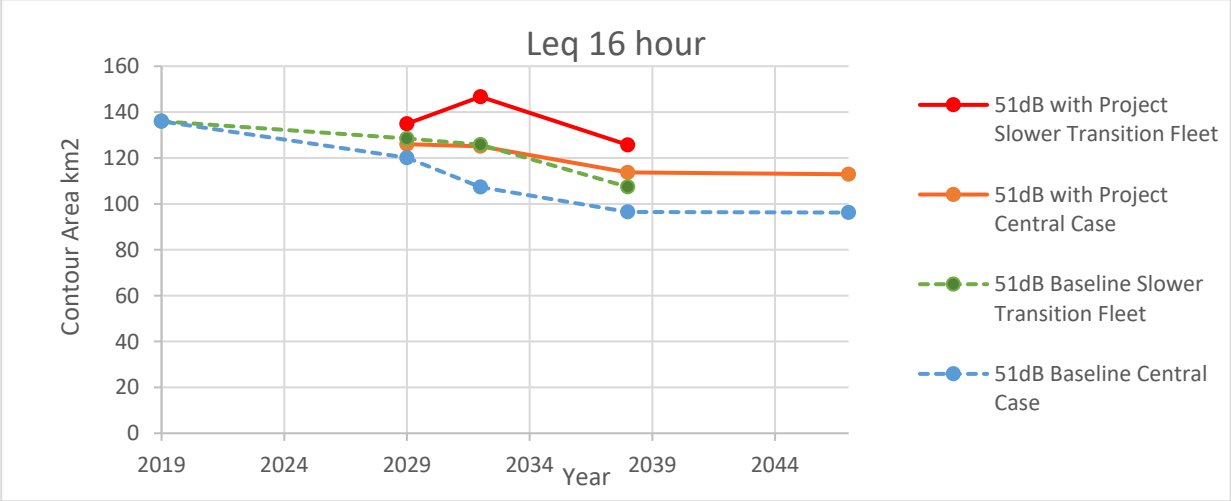
Primary Noise Metrics

14.9.19 Figure 14.9.1 shows the 2032 scenario with the Project $L_{eq,\ 16\ hour}$ day noise contours. Also included on Figure 14.9.1 are the seven Community Representative Locations referred to elsewhere in this chapter. Diagram 14.9.1 shows how the area and populations within the $L_{eq,\ 16\ hour}$ 51 LOAEL contours are expected to change compared to the baseline situation in 2019, 2029, 2032, 2038 and 2047. Full results are provided in Appendix 14.9.2. As described in Section

14.5 the central fleet forecast case and a slower transition fleet case have been modelled to give the range of baseline and with Project conditions in the future.

Diagram 14.9.1: Leq, 16 hour Day Contour Populations and Areas: 2019, 2029, 2032, 2038 and 2047





14.9.20 In 2032, the population within the LOAEL $L_{eq,\ 16\ hour}$ day 51 dB contour is predicted to rise from 16,100 to 23,500 in the base case to 18,800 to 26,400 with the Project but remain below the 2019 level of 24,050 except in the slower transition fleet case. Thus, the Project is predicted to increase the population within the LOAEL $L_{eq,\ 16\ hour}$ day 51 dB contour by 2,700 to 2,900 people in 2032. In 2032, the area of the LOAEL $L_{eq,\ 16\ hour}$ day 51 dB contour is predicted to increase from 107.3 to 125.8 km^2 in the base case to 125.1 km^2 to 146.7 with the Project and would remain below the 2019 area of 136.0 km^2 in the central case but exceed it in the slower transition fleet case before dropping back to below it by 2038.

14.9.21 In the year of opening, 2029, for both the central and slower transition fleet cases, the area of the LOAEL $L_{eq,\ 16\ hour}$ day 51 dB contour is predicted to increase slightly above the baseline in 2029, but the population within it is predicted to reduce slightly. This is because of the slight shift in the noise contour near the airport northwards away from the Forge Wood residential area to the south.

14.9.22 In 2032, the population within the SOAEL $L_{eq,\ 16\ hour}$ day 63 dB contour is predicted to rise from approximately 400 to 500 in the base case to approximately 500 to 600 with the Project, and approximately equal the 500 people in 2019. These population counts are rounded to the nearest 100, as discussed below.

14.9.23 Inspection of the central case $L_{eq,\ 16\ hour}$ day 63 dB contours in detail shows approximately 30 additional residential properties (approximately 80 people) within the SOAEL contour in 2032 compared to the 2032 baseline situation, at which significant adverse effects on health and quality of life would be expected, and mitigation is proposed in the form of noise insulation.

14.9.24 Inspection of the slower transition case $L_{eq,\ 16\ hour}$ day 63 dB contours in detail shows approximately 60 additional residential properties (approximately 160 people) within the SOAEL contour in 2032 compared to the 2032 baseline situation, at which significant adverse effects on health and quality of life would be expected, and mitigation is proposed in the form of noise insulation. Of these approximately 60 additional residential properties only approximately 5, in the Russ Hill area, are not in the SOAEL $L_{eq,\ 16\ hour}$ day 63 dB in 2019.

14.9.25 In both the central and slower transition fleet cases, to the south of the airport approximately 10 properties would be removed from the SOAEL $L_{eq,\ 16\ hour}$ day 63 dB zone, the level above which there are significant effects on health and quality of life.

14.9.26 Figure 14.9.2 shows the 2032 with Project versus 2032 baseline difference, $L_{eq,\ 16\ hour}$ day noise contours for the central case. Figure 14.9.3 shows the 2032 with Project versus 2032 baseline difference, $L_{eq,\ 16\ hour}$ day noise contours for the slower transition case. The changes in $L_{eq,\ 16\ hour}$ day noise levels in 2032 as a result of the Project are summarised in Table 14.9.1. Only areas and populations within the LOAEL $L_{eq,\ 16\ hour}$ day 51 dB contours with the Project are counted, changes outside this are not.

Table 14.9.1: Changes in $L_{eq,\ 16\ hour}$ Day Noise Levels; 2032 With Project Versus 2032 Baseline [(1)]

Noise Change Band $L_{eq,\ 16\ hour}$ Day dB	Area (km^2)	Population	Comment
-6 to -3	0.5 - 0.9	-	Lowfield Farm on Charlwood Road and mostly within the airport boundary south of the main runway.
-3 to -2	1.2 – 1.4	<100	Approximately 20 houses on Charlwood Road, Poles Lane and Bonnetts Lane south of the airport.
-2 to -1	2.8 – 2.8	500	South of the airport on Charlwood Road, Bonnetts Lane and houses on the north tip of Ifield near the Crawley Rugby Club.
-1 to 0	4.7 – 6.4	1,200 – 4,300	South west of the airport in the area of Ifield Wood Road west of Ifield, and in the Tinsley Green area (Radford Road, Balcombe Road, Forge Wood) south east of the airport.
0 to +1	83.6 – 96.7	12,800 – 16,000	East of the airport (excluding an area around Smallfields) and west of the airport south of the extended runway centerline including Rusper and Kingsfold. The northern part of Charlwood, north of Horley Road.

Noise Change Band $L_{eq, 16 hour}$ Day dB	Area (km^2)	Population	Comment
+1 to +2	25.2 – 32.6	4,800 – 6,500	West of the airport north of the extended runway centerline including the southern part of Charlwood and Capel. East of the airport north of the extended runway centerline including parts of Smallfield.
+2 to +3	4.0 – 4.2	300 - 400	West of the airport north of the extended runway centerline including parts of Russ Hill Road, Ifield Road and Partridge Lane to the South of Charlwood.
+3 to +6	2.1 - 2.3	<100	Mainly within the airport. Approximately 20 properties on Ifield Road approximately 1 km west of the airport boundary and approximately 20 properties in Russ Hill approximately 2 km west of the airport.
>+6	0.8	0	Within the airport.

1. Ranges cover the central case fleet noise modelling and the slower transition fleet noise modelling.

14.9.27 The following paragraphs describe the significance of these predicted noise changes using the methodology described in Section 14.4.

14.9.28 Approximately 1,700 to 4,800 people living south of the airport are predicted to experience small reductions in noise because some aircraft that would have used the main runway in 2032 would be using the northern runway instead, on a flight path 200 metres further north. These are negligible to low noise reductions affecting medium to very high populations and likely to lead to **minor beneficial** but not significant effects.

14.9.29 The majority (61 to 68%%) of the population within the LOAEL $L_{eq, 16 hour}$ day 51 dB contour are predicted to experience an increase in noise level of less than 1 dB as a result of the Project in 2032 compared to the 2032 baseline. These are negligible increases and would give rise to **negligible** effects.

14.9.30 To the north of the extended runway centreline, and predominantly to the west, approximately 4,800 to 6,500 people are predicted to experience increases in noise of 1 to 2 dB. These are low increases in noise and because noise levels in this area are well below SOAEL are likely to result in **minor adverse** and not significant effects. The majority of the residential properties in these areas would be eligible for the new Outer Zone NIS, which would further reduce noise effects in these areas.

14.9.31 To the west, approximately 300 to 400 people are expected to experience noise increases of 2 to 3 dB. The majority of this area is covered by the existing NIS. These are low increases in noise affecting a low sized population giving rise to generally **minor adverse** effects. All of the residential properties in these areas would be eligible for the new Outer Zone NIS, which would further reduce noise effects in these areas. Some of these properties are above SOAEL and are likely to experience potentially **moderate adverse** significant effects. However, these residential properties would be eligible for full noise insulation under the new Inner Zone NIS, to mitigate the potentially significant effects.

14.9.32 Approximately 2 km to the west of western end of the northern runway approximately 20 properties in the Russ Hill area have been identified as experiencing increases of greater than 3 dB. These properties are predicted to experience medium to high noise increases, so these effects are potentially **moderate adverse** significant effects. All the residential properties in this area would be eligible for the new Inner Zone NIS, which would avoid significant noise effects in this area.

14.9.33 Approximately 1 km to the west of western end of the northern runway the following 20 properties on Ifield Road have been identified as experiencing increases of 3-6 dB:

- Longmeadow Villas (8 dwellings)
- Cottesmore House
- The Seasons
- Oak Gates
- Pine Trees
- Squirrels Leap
- Beech Hay
- Little Oaks
- The Gallops
- Birchfield House, and
- Woodcote (approximately 3 dwellings).

14.9.34 These properties on Ifield Road are predicted to experience medium to high noise increases for properties already above the SOAEL, so are potentially subject to **moderate adverse** significant effects. These houses would be eligible for full noise insulation under the new Inner Zone NIS, to mitigate the potentially significant effects.

14.9.35 All residential properties forecast to be within the $L_{eq\ 16\ hour}$ day 63 dB contour would be eligible for full noise insulation under the new Inner Zone NIS, to mitigate the potentially significant effects. The extent of the NIS is shown in Figure 14.8.1. Figure 14.9.4 shows the central case 2032 with Project versus 2019 baseline difference, $L_{eq,\ 16\ hour}$ day noise contours, illustrating how noise levels in 2032 with the Project would change compared to the 2019 baseline. This shows larger areas with noise levels reducing from the 2019 baseline to 2032 with the Project than increasing, reflecting the overall reduction in the size of all the noise contours in the central case.

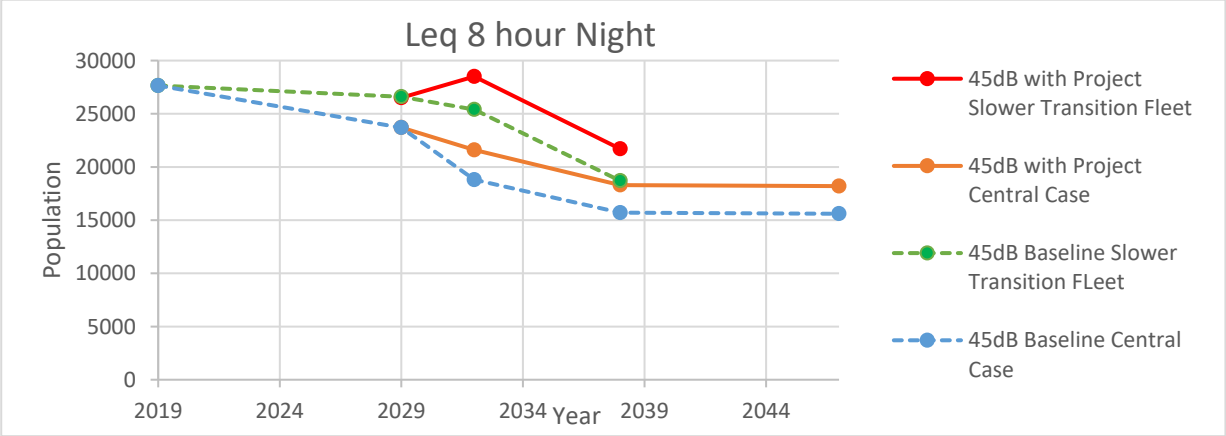
14.9.36 Figure 14.9.5 shows the slower transition fleet case in 2032 with Project versus 2019 baseline difference, $L_{eq,\ 16\ hour}$ day noise contours, illustrating how noise levels in 2032 with the Project would change compared to the 2019 baseline. This shows larger areas with noise levels increasing from the 2019 baseline to 2032 with the Project than reducing, reflecting the overall increase in the size of all the noise contours in the slower transition fleet case. Note however, the slower transition fleet noise contours would reduce to be smaller than those in 2019 by 2038 (see Appendix 14.9.2 for details).

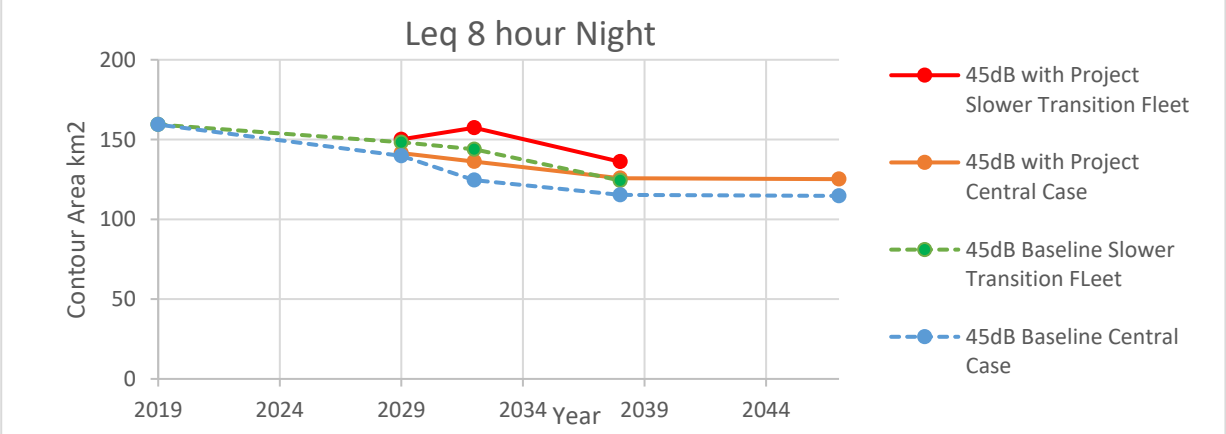
14.9.37 Figure 14.9.6 shows the 2013 baseline $L_{eq,\ 16\ hour}$ day noise contours. The areas and populations within each are provided in Appendix 14.9.2. At that time 51 dB levels were not produced. The largest contour, $L_{eq,\ 16\ hour}$ day 54 dB had an area of 77.1 km^2 and a population of 9,700 people. The forecast 2032 with Project $L_{eq,\ 16\ hour}$ day 54 dB contour has an area of 66.1 to 80.5 km^2 and a population of 9,000 to 10,900. Thus, for the central case forecast the 2032 with Project $L_{eq,\ 16\ hour}$ day 54 dB contour is smaller than in 2013 and for the slower transition case in 2032 it is slightly larger. In the years following 2013 the noise contours grew slightly and in 2016 and 2017 the $L_{eq,}$

$_{16\ hour}$ day 54 dB had a areas of 86.5 and 82.7 km^2, which are larger than the slower transition case forecast in 2032.

14.9.38 Figure 14.9.7 shows the 2032 with Project $L_{eq,\ 8\ hour}$ night contours. Diagram 14.9.1 shows how the area and populations within the $L_{eq,\ 8\ hour}$ night 45 dB contours are expected to change compared to the baseline in 2019, 2029, 2032, 2038 and 2047. As described in Section 14.5 the central fleet forecast case and a slower transition fleet case have been modelled to give the range of baseline and with Project conditions in the future. Full results are provided in Appendix 14.9.2.

Diagram 14.9.2: Populations and $L_{eq,\ 8\ hour}$ Night Contour Areas: 2019, 2029, 2032, 2038, 2047





14.9.39 In 2032, the population within the LOAEL $L_{eq,\ 8\ hour}$ night 45 dB contour is predicted to rise from 18,800 to 25,400 in the base case to 21,600 to 28,500 with the Project. Thus, the Project is predicted to increase the population within the LOAEL $L_{eq,\ 8\ hour}$ night 45 dB contour by 2,800 to 3,100 people in 2032. In 2019 there were approximately 27,650 people living with in the LOAEL $L_{eq,\ 8\ hour}$ night 45 dB contour. Thus, compared to 2019, in 2032 with the Project the population within the LOAEL $L_{eq,\ 8\ hour}$ night 45 dB contour is predicted to decrease by 6,050 in the central case and to increase by 850 in the slower transition case. In 2032, the area of the LOAEL $L_{eq,\ 8\ hour}$ night 45 dB contour is predicted to increase from 124.6 to 143.9 km^2 in the base case to 136.2 to 157.4 km^2 with the Project and would remain below the 2019 area of 159.4 km^2 in both the central case and slower transition fleet cases.

14.9.40 In 2032, the population within the SOAEL $L_{eq, 8\ hour}$ night 55 dB contour is predicted to rise from approximately 900 to 1,100 in the base case to approximately 1,000 to 1,200 with the Project, and remain below the approximately 1,250 people in 2019. Thus, the Project is predicted to increase the population within the SOAEL $L_{eq, 8\ hour}$ night 55 dB contour by approximately 100 people in 2032 compared to the baseline in 2032. These population counts are rounded to the nearest 100. Inspection of the 55 dB contours in detail shows approximately 60 additional residential properties (approximately 160 people) are within the SOAEL contour in 2032 compared the 2032 base, at which significant adverse effects on health and quality of life would be expected, and mitigation is proposed in the form of noise insulation, as discussed below. The areas within the day and night SOAEL contours overlap so that the total number of properties within the day or night SOAEL contour due to noise increases from the Project in 2032 is approximately 80 (approximately 200 people).

14.9.41 Figure 14.9.8 shows the 2032 situation with the Project versus the 2032 baseline difference $L_{eq, 8\ hour}$ night noise contours for the central case. Figure 14.9.9 shows the 2032 with Project versus 2032 baseline difference, $L_{eq, 8\ hour}$ night noise contours for the slower transition case. The changes in $L_{eq, 8\ hour}$ night noise levels in 2032 as a result of the Project are summarised in Table 14.9.2. Only areas and populations within the LOAEL $L_{eq, 8\ hour}$ night 45 dB contours with the Project are counted, changes outside this are not.

Table 14.9.2: Changes in $L_{eq, 8\ hour}$ Night Noise Levels; 2032 With Project Versus 2032 Base (1)

Noise Change Band dB	Area (km^2)	Population	Comment
-1 to 0	3.2	100 - 200	South west of the airport in the area of Poles Lane, Bonnetts Lane and Charlwood Road.
0 to +1	124.9	20,900 – 28,100	East of the airport and west of the airport.
+1 to +2	6.6	300 - 500	West of the airport north of the extended runway centerline including properties on Ifield Road south of Charlwood, in Russ Hill and on Partridge Lane to the west.
+2 to +3	0.7	0	Within the airport and immediately west of the west end of the northern runway.
>+3dB	0.8	0	Within the airport.

(1) Ranges cover the central case fleet noise modelling and the slower transition fleet noise modelling.

14.9.42 Approximately 100 to 200 people living south of the airport are predicted to experience reductions in $L_{eq, 8\ hour}$ night noise levels of less than 1 dB. This is a negligible decrease, likely to give rise to **negligible** effects.

14.9.43 The vast majority (97 to 99 %) of the population within the LOAEL $L_{eq, 8\ hour}$ night 45 dB contour are predicted to experience increases in noise level of less than 1 dB at night as a result of the Project in 2032 compared to the 2032 baseline. This is a negligible increase, likely to give rise to **negligible** effects.

14.9.44 To the west of the northern runway west end approximately 300 to 500 people would experience an increase of 1 to 2 dB. These are low increases affecting a low size of population, so are likely

to give rise to generally **minor adverse** effects. All of the residential properties in these areas would be eligible for the new Outer Zone NIS, which would further reduce noise effects in these areas. Some of these properties are above SOAEL and are likely to experience potentially **moderate adverse** significant effects. However, these residential properties would be eligible for full noise insulation under the new Inner Zone NIS, to mitigate the potentially significant effects.

14.9.45 All residential properties forecast to be within the $L_{eq\ 8\ hour}$ day 55 dB contour would be eligible for full noise insulation under the new Inner Zone NIS, to mitigate the potentially significant effects. The extent of the NIS is shown in Figure 14.8.1.

14.9.46 The changes in noise levels expected from the Project at night-time are smaller than during the day because the northern runway would not generally be used between 23:00 and 06:00 hours and because the night flight restrictions are assumed to limit growth in night flights.

14.9.47 Figure 14.9.10 shows the central case 2032 with Project versus 2019 baseline difference, $L_{eq,\ 8\ hour}$ night noise contours, illustrating how noise levels in 2032 with the Project would change compared to the 2019 baseline. Figure 14.9.10 shows that compared to 2019 night noise levels with the Project in 2032 would reduce in nearly all areas around the airport.

14.9.48 Figure 14.9.11 shows the slower transition fleet case in 2032 with Project versus 2019 baseline difference, $L_{eq,\ 8\ hour}$ night noise contours, illustrating how noise levels in 2032 with the Project would change compared to the 2019 baseline. This shows areas to the west with noise levels increasing slightly and larger areas to the east with noise levels reducing slightly from the 2019 baseline to 2032 with the Project, reflecting the overall slight decrease in the size of all the noise contours in the slower transition fleet case.

14.9.49 Figure 14.9.12 shows the 2013 baseline $L_{eq,\ 8\ hour}$ night noise contours. The areas and populations within each are provided in Appendix 14.9.2. At that time 45 dB contours were not produced. The largest contour, $L_{eq,\ 8\ hour}$ night 48 dB had an area of 91.2 km^2 and a population of 11,200 people. The forecast for 2032 with the Project $L_{eq,\ 8\ hour}$ night 48 dB contour has an area of 75.1 to 88.0 km^2 and a population of 9,900 to 11,900 indicating that the 2032 $L_{eq,\ 8\ hour}$ night 48 dB contour area would be lower than in 2013 and the population would be lower in the central case but slightly higher in the slower transition case. The population living in the area around the airport will have increased between 2013 and 2032 which accounts for this smaller contour yet larger population.

Secondary Noise Metrics

14.9.50 Noise levels are presented in this section using the set of required noise metrics that are supplementary to the main metrics used to judge significance of noise impacts. They provide additional information to illustrate where noise changes are expected.

14.9.51 Figure 14.9.13 shows the 2032 northern runway N65 day contours. The population exposed to at least 20 aircraft noise events above L_{max} 65 dB on an average summer day is predicted to be approximately 17,400 to 32,200 compared to 15,300 to 28,300 in the 2032 baseline. This would be below the 2019 level of 24,100 in the central case, but above it in the slower transition fleet case.

14.9.52 Figure 14.9.14 and Figure 14.9.15 show the 2032 with Project versus 2032 baseline difference N65 day noise contours, for the central and slower transition cases, illustrating how noise levels in 2032 with the Project would change compared to the 2032 baseline. Areas to the south are

expected to experience some reductions in numbers of flights above L_{max} 65 dB during the day including the northern edge of Crawley. North of the airport, N65 levels would increase and under the main arrivals and departure routes on the extended runway centrelines increases of 50 to 100 noise events above L_{max} 65 dB per day are expected. These changes are described more specifically in the following section on Community Representative Locations.

14.9.53 Figure 14.9.16 and Figure 14.9.17 show the 2032 with Project versus 2019 baseline difference N65 day noise contours, for the central and slower transition cases, illustrating how noise levels in 2032 with the Project would change compared to the 2019 baseline.

14.9.54 Figure 14.9.18 shows the 2032 with Project N60 night contours. The population exposed to at least 10 aircraft noise events above L_{max} 60 dB on an average summer night is predicted to be approximately 29,600 to 33,800 compared to 28,900 to 31,500 in the 2032 baseline, and below the 2019 level of 33,850.

14.9.55 Figure 14.9.19 and Figure 14.9.20 show the 2032 with Project versus 2032 Baseline difference N60 night noise contours, for the central and slower transition fleet cases, illustrating how noise levels in 2032 with the Project would change compared to the 2032 baseline. As seen above for $L_{eq,\ 8\ hour}$ night noise levels, the changes predicted due to the Project at night are smaller than during the day, with areas further from the airport seeing increases of less than 5 and areas closer seeing increases of 5-10. These changes are described more specifically in the following section on Community Representative Locations.

14.9.56 Figure 14.9.21 and Figure 14.9.22 show the 2032 with Project versus 2019 baseline difference N60 night noise contours, for the central and slower transition fleet cases, illustrating how noise levels in 2032 with the Project would change compared to the 2019 baseline.

Lmax Levels

14.9.57 Figure 14.9.23 shows L_{max} 60 dB and L_{max} 65 dB noise footprints for an A320 departing the main runway and the northern runway along each of the main departure routes to the east and west. The A320 was chosen because it is one of the most common aircraft at Gatwick. The changes in L_{max} levels as a result of A320s using the northern runway instead of the main runway can be seen, with no or very small change in areas further from the airport.

14.9.58 Figure 14.9.24 shows L_{max} 60 dB and L_{max} 65 dB noise footprints for an A320 Neo departing the main runway and the northern runway along each of the main departure routes to the east and west. As with the A320 footprints, it can be seen that the changes in L_{max} levels as a result of A320 Neos using the northern runway instead of the main runway are small with very small or no change in areas further from the airport. The extent to which A320 Neos are quieter than the A320s on departure is also clearly illustrated by the much smaller footprints.

14.9.59 Figure 14.9.25 shows the A320's L_{max} difference contours for a single departure on the northern runway compared to on the main runway. To illustrate the difference in L_{max} levels for departures, a Standard Instrument Departure to the west (Bognor, BOG) and to the east (Clandon, CLN) are shown. L_{max} levels increase to the north and decrease to the south of the runways, as would be expected, as discussed in more detail as follows.

14.9.60 For departures from the northern runway to the east, the area within which L_{max} levels would increase by more than 3 dB is mainly within the airfield and reaches to the east just beyond the Balcombe Road including a small area of houses. Similarly to the east the area within which L_{max}

levels would decrease by more than 3 dB to the south affects a small area of housing as far as the Balcombe Road.

14.9.61 For departures from the northern runway to the west, the area within which L_{max} levels would increase by more than 3 dB reaches as far as Russ Hill encompassing a population of up to 300 people who may perceive A320 departures as noticeably louder. Also to the west, the area within which L_{max} levels would decrease by at least 3 dB to the south includes housing areas of Langley Green and north Ifield, indicating that over 1,000 people would perceive A320 departures from the northern runway as noticeably quieter. This benefit is partly because the northern runway would move departures 200 metres to the north, but also because for westerly departures they would also be moved west approximately 750 metres because the northern runway eastern end is moved west by 750 metres.

Lden and Lnight Annual Average Noise Levels

14.9.62 The primary and secondary noise metrics ($L_{eq,\ 16\ hr}$ day, $L_{eq,\ 8\ hr}$ night, N65 day and N60 night) are all predicted for an average summer day because this is when the airport is usually busiest and noisiest. However, in order to illustrate how noise levels over the whole year will change with the Project, L_{den} and L_{night} noise levels has also been modelled, consistent with common practice in the European Union and associated regulations. The areas and population within these contours in 2032 with the Project are summarised in Table 14.9.3.

Table 14.9.3: 2032 (Standard Mode) Annual L_{den} and L_{night} Noise Levels with Project (1)

Noise Metric	Noise Contour Area (km^2)	Population
L_{den}:		
>55 dB	86.1 - 100.9	11,500 – 14,700
>60 dB	28.2 - 34	1,800 – 2,200
>65 dB	11.3 - 13.6	500 - 500
>70 dB	4 - 5	200 - 200
>75 dB	1.7 - 2	0 - 0
L_{night}:		
>45 dB	101.6 - 117.5	13400 - 18000
>50 dB	33.6 - 40.3	3200 - 4400
>55 dB	13.2 - 15.6	600 - 800
>60 dB	4.7 - 5.7	200 - 300
>65 dB	1.8 - 2.1	0 - 0
>70 dB	0.9 - 1.1	0 - 0

(1) Ranges cover the central case fleet noise modelling and the slower transition fleet noise modelling.

14.9.63 Figure 14.9.26 shows the L_{den} contours in 2032 with the Project for the central case and slower transition fleet cases.

14.9.64 Figure 14.9.27 shows the L_{night} contours in 2032 with the Project for the central case and slower transition fleet cases.

14.9.65 L_{night} is a measure of the 8 hour night noise levels averaged over the whole year. In all cases the summer $L_{eq\ 8\ hr}$ noise contours are larger than the annual average L_{night} contours (by about 35%) indicating how the summer noise levels, that have been used in this assessment, are higher than the annual average.

14.9.66 The increase in size of the annual L_{night} contours in 2032 due to the Project compared to the 2032 base is 11-12%, which is slightly larger than the increase in the summer $L_{eq\ 8\ hr}$ noise contours of 9%. The increase in area of the annual day evening night L_{den} noise levels due to the Project in 2032 compared to the 2032 base is 17% which is the same as the increase in the summer daytime $L_{eq\ 16\ hr}$ 51 dB contours in 2032. Overall this suggest that any seasonality in the way the extra capacity delivered by the Project is used has little effect on noise levels across seasons.

Overflights

14.9.67 CAP 1616 notes that where a proposal is expected to change traffic patterns below 7,000 feet, the Secretary of State has specified that 'overflight' must be portrayed.

14.9.68 Close to the extended northern runway centreline, such as in the area south of Charlwood, there are areas that are currently 'overflown' only when the northern runway is used during maintenance/standby use, that would be routinely overflown when the northern runway is in use daily. Using the CAA definition of overflight (see Appendix 14.9.2), an analysis of the areas overflown by the most common rapid climbing aircraft, the A319, has been undertaken for the main runway and the northern runway, using the mean departure profile for this aircraft. Figure 14.9.28 shows the areas (in red) that would be routinely overflown by A319 departures from the northern runway but which are not overflown by departures from the main runway. Similarly Figure 14.9.28 shows areas that are overflown by A319 departures from the main runway but not the northern runway (in blue).

14.9.69 Figure 14.9.28 shows the areas (in red) that would be routinely newly overflown by the routine departures from the northern runway, as follows.

- To the east – an approximately 200 metre wide strip of land extending 6 km from the eastern edge of the airport as far as the point where departures using the KEN/SAM (Kenet/Sampton) standard instrument departure (SID) route on the main runway and northern runways converge as they turn north.
- To the west – an approximately 200 metre wide strip of land extending 5 km from the western edge of the airport as far as the point where departures using the LAM/BIG/CLN/DVR SID route (Route 4) on the main runway and northern runways converge as they turn north. Beyond this, further west than the Route 4 northerly turn, the area extends a further 9 km as far as the where departures using the KEN/SAM, HAR/BOG and SFD SID routes on the main runway and northern runways converge as they turn south.

14.9.70 The area to be newly routinely overflown to the east crosses the A23 and mainly sparsely populated areas, apart from the area south of Smallfields which includes approximately 100 houses.

14.9.71 The area to be newly routinely overflown to the west crosses mainly sparsely populated areas, apart from approximately 10 properties on the Ifield Road and scattered properties beyond. West of the Route 4 turn the area crosses the village of Wallis Wood but in this area an A319 has typically reached a height of at least 4,500 feet.

14.9.72 This analysis is for a typical A319 aircraft. Other aircraft would climb at different rates and of course, aircraft disperse from the centreline modelled, but the analysis is intended to give an indication of size of the areas that would see more aircraft in the sky due to routine use of the northern runway. Figure 14.9.28 also shows the areas to the south for which the movement of flights from the main runway to the northern runway in itself would lessen overflights.

14.9.73 Figures 14.6.7 to 14.6.9 show the baseline modelling of overflights in 2018, with Figure 14.6.7 showing all flights within 35 miles of Gatwick below 7,000 feet above ground level. In Figure 14.9.29 the number of Gatwick flights has been increased by 20% on the 2018 value while keeping all other 2018 baseline parameters (non-Gatwick flights and their airspace routings) the same. This is to provide some indication of the scale of change brought by the Project purely in the terms of current cumulative overflights. Implementation of the Government's FASI-S programme would result in a different cumulative track density as a result of higher numbers of movements from other airports routing around London, but there is insufficient information available at this time to assess this. The 20% increase in flight movements equates to approximately the increase to 2032 traffic levels (see Appendix 14.9.2 for details).

14.9.74 Clearly under the arrivals and departure routes close to Gatwick the increase of 20% in Gatwick flights gives a 20% increase in total flights. In areas away from the extended runway centrelines, where there are overflights from other airports as well as from Gatwick, this is not the case, for example over parts of Tunbridge Wells.

14.9.75 This overflights analysis has been used in the Chapter 8: Landscape, Townscape and Visual Resources assessment of tranquillity and in the Chapter 7: Historic Environment assessment of impacts on sensitive heritage assets, as reported further in Section 14.11.17.

Community Representative Locations

14.9.76 Figure 14.9.1 shows the location of the following seven Community Representative Locations that were chosen at which describe the noise changes expected from the Project in more detail. In this section on the changes expected at Community Representative Locations for the central case are described. The equivalent information for the slower transition fleet case can be found in Section 5 of Appendix 14.9.2.

- Rusper Primary School – in the centre of the village of population approximately 1,400, located 5 km to the west of the airport on the 2032 with Project $L_{eq,\ 16\ hour}$ day 51 dB contour.
- Charlwood Village Infant School – in the north of the village of population approximately 2,400, located 1 km to the north west of the airport near the 2032 with Project $L_{eq,\ 16\ hour}$ day 54 dB contour.
- Lingfield Primary School – near the centre of the village of population approximately 4,400, located 10 km to the east of the airport under the approach flight path near the 2032 with Project $L_{eq,\ 16\ hour}$ day 57 dB contour.
- Chiddingstone Church of England School – in the centre of the village of population approximately 1,300, located 7 km to the west of the airport near the 2032 with Project $L_{eq,\ 16\ hour}$ day 51 dB contour.
- Capel Pre School – in the east side of the village of population approximately 1,200, located 22 km to the east of the airport near the 2032 with Project $L_{eq,\ 16\ hour}$ day 54 dB contour.
- Willow Tree Pre-school, Ifield – on the north side of Ifield which is the northern district of Crawly, located 1.3 km to the south of the airport outside the 2032 with Project $L_{eq,\ 16\ hour}$ day 51 dB contour.

- Barnfield Care Home, Horley – within the residential area of Horley, located 600 m to the north of the airport just outside the 2032 with Project $L_{eq, 16\ hour}$ day 51 dB contour.

14.9.77 These seven locations represent approximately half of the population within the 2032 $L_{eq, 16\ hour}$ day 51 dB contour with the Project in the central case. Appendix 14.2 provides seven tables giving the full results of modelling for all noise metrics at each of these locations. $L_{eq, 16\ hour}$ day, $L_{eq, 8\ hour}$ night, N65 day and N60 night levels are provided for easterly and westerly operating days, for 2019, the 2032 base case and the 2032 with Project case, to illustrate the changes in the noise environment that can be expected in each location. These tables are provided for the central case and the slower transition fleet case. The following sections summarise the changes in the noise environment that can be expected in 2032 with the Project, for the central case, compared with the 2032 baseline and 2019 baseline in each of these areas. Each paragraph is intended to give more detail for stakeholders interested in noise impacts in that area or near to it.

Rusper Primary School

14.9.78 At Rusper Primary School, in 2032 the Project is predicted to increase average summer day L_{eq} noise levels by 0.3 dB for daytime and 0.5 dB for night-time compared to the 2032 base case, and to reduce daytime and night-time levels by 1.4 dB and 0.9 dB compared to 2019. Situated to the west and offset from the arrivals route, this location has higher noise levels for westerly operations. On westerly operations the 2019 number of noise events above L_{max} 65 dB in the day was 26 and this is predicted to reduce to 7 by 2032 both with and without the Project. On easterly operations, Rusper in 2019 had no L_{max} events above 65 dB in the day and this is not expected to change with the Project. On easterly operations, Rusper in 2019 had one Lmax events above 60 dB in the night and this is expected to reduce to none with or without the Project. In the future Rusper would benefit from the gradual reduction in aircraft noise levels on departure in the base case and the slight movement of some flights away from it with the Project.

Charlwood Infant School

14.9.79 At Charlwood Infant School, in 2032 the Project is predicted to increase average summer day L_{eq} noise levels by 0.5 dB for daytime and 0.5 dB for night-time compared to the 2032 base case, and to reduce daytime and night-time levels by 1.9 dB and 1.4 dB compared to 2019. Situated to the north west of the airport, the village is exposed to noise from departures on westerlies, and noise from arrivals on easterlies. On westerly operations there are currently about 158 events above L_{max} 65 dB in the daytime in 2019. This is forecast to reduce in the future, in 2032, both in the base case, to 32, and with the Project, to 102. This is because aircraft are becoming quieter on departure, and the altered northern runway would not generally be used by the largest aircraft. On easterly operations there are currently about 23 events above L_{max} 65 dB in the daytime in 2019. This is forecast to reduce in the future, in 2032 in the base case, to 4, and with the Project to 7, as the number of arrivals on the main runway increases.

Lingfield Primary School

14.9.80 At Lingfield Primary School, in 2032 the Project is predicted to increase average summer day L_{eq} noise levels by 0.8 dB for daytime and 0.3 dB for night-time compared to the 2032 base case, and to increase daytime noise levels by 0.3 dB and decrease night-time levels by 0.4 dB compared to 2019. Situated under the arrivals flight path to the east of the airport, noise levels are higher by about 5 dB L_{eq} on westerlies than easterlies. On westerly operations, there are currently about 286 events above L_{max} 65 dB in the daytime (in 2019). This is forecast to increase

in the future, in 2032 in the base case, to 301, and with the Project, to 367. On easterly operations there are roughly half as many events above L_{max} 65 dB compared to westerly operations and similar changes are predicted. At Lingfield and Chiddingstone, average summer day noise levels are dominated by arrivals noise because they are located to the east of the airport. Of the seven Community Representative Locations, they are the only two locations where increased $L_{eq, 16\ hour}$ day noise levels, by 0.3 and 0.8 dB respectively, are expected in 2032 with the Project compared to 2019. Night noise levels are predicted to reduce over this period, by 0.8 and 0.7 dB.

Chiddingstone Church of England School

14.9.81 At Chiddingstone Church of England School in 2032, the Project is predicted to increase average summer day L_{eq} noise levels by 0.8 dB for daytime and 0.4 dB for night-time compared to the 2032 base case, and to increase daytime noise levels by 0.6 dB and decrease night-time levels by 0.7 dB compared to 2019. Situated under the arrivals swathe 22 km to the east of the airport, noise levels are higher by about 8 dB L_{eq}, on westerlies than easterlies. On easterly operations there are very few events above L_{max} 65 dB in the daytime, only one in 2019. On westerly operations there are currently about 38 events above L_{max} 60 dB in the night, and this is predicted to drop slightly to 36 with the Project in 2032 as opposed to dropping slightly to 34 in the 2032 base case.

Capel Pre-School

14.9.82 At Capel Pre-School in 2032, the Project is predicted to increase average summer day L_{eq} noise levels by 1.2 dB for daytime and 0.7 dB for night-time compared to the 2032 base case, and to reduce daytime and night-time levels by 0.7 dB and 0.8 dB compared to 2019. Capel is situated to the west of the airport under a westerly departure route, and is offset from the arrivals route so this location has substantially higher noise levels for westerly operations. On westerly operations in 2019 the number of noise events above L_{max} 65 dB in the day was 146 and this is predicted to increase to 163 by 2032 with the Project and to reduce to 128 in the base case. On easterly operations Capel in 2019 had no L_{max} events above 65 dB in the day or above L_{max} 60 dB at night, and this is not expected to change with the Project.

Willow Tree Pre-School

14.9.83 At Willow Tree Pre-School, Ifield, in 2032, the Project is predicted to decrease average summer day L_{eq} noise levels by 0.6 dB for daytime and to increase them by 0.2 dB for night-time compared to the 2032 base case, and to reduce daytime and night-time levels by 3.3 dB and 1.9 dB compared to 2019. Situated to the south of the airport, the area is affected by arrivals from the west and departures to the west, and noise levels on easterly and westerly operations are similar. On westerly operations there are currently very few (11) events above L_{max} 65 dB in the daytime in 2019 and this is forecast to reduce to 2 in the 2032 with or without the Project. On easterly operations similar changes are expected.

Barnfield Community Care Home

14.9.84 At Barnfield Community Care Home, Horley, in 2032, the Project is predicted to increase average summer day L_{eq} noise levels by 0.7 dB for daytime and 0.6 dB for night-time compared to the 2032 base case, and to reduce daytime and night-time levels by 1.4 dB and 1.1 dB compared to 2019. Situated to the north east of the airport, the area is affected by arrivals from the east and departures along the runway to the west, and overall noise levels on easterly and westerly

operations are similar. The numbers of noise events above L_{max} 65 dB during the day on westerly operations was zero in 2019. On easterly operations in 2019 the number of noise events above L_{max} 65 dB in the day was 19 and this is predicted to increase to 22 by 2032 with the Project and to reduce to 4 in the base case. This location is also affected by ground noise from the airport and road traffic noise, as discussed elsewhere in this chapter, including in Section 14.11.17 (Inter-related Effects).

Noise Sensitive Buildings

14.9.85 Figure 14.9.30 shows 50 noise sensitive community buildings taken from the 'PointX' (2018) database (see PointX.co.uk) that are predicted to be within the $L_{eq, 16\ hour}$ day 51 dB noise contour in 2032 with the Project in the central case. These comprise 21 schools, one hospital, 18 places of worship and seven community buildings. Details of the predicted noise levels at each are provided in Appendix 14.9.2 for the central and slower transition fleet cases. At 42 of these buildings noise levels are predicted to either decrease or increase by less than 1 dB, ie a negligible change, as a result of the Project compared to the 2032 baseline. The predicted noise increases above 1 dB are as follows:

- Scott Broadwood C of E Infant School, RH5 5JX +1.3 dB;
- Capel Pre School, RH5 5JX +1.2 dB;
- Aurora Redehall School, RH6 9QA +1.2 dB;
- St John the Baptist's Church, Capel, RH5 7JY +1.3 dB;
- The Chapel, RH6 0DQ +1.3 dB; and
- Capel Village Hall, RH5 5LB +1.3 dB.

14.9.86 There are two places of worship where the Project is predicted to reduce $L_{eq, 16\ hour}$ daytime noise levels:

- St Michael and All Angels' Church, Crawley RH11 0PQ -1.2 dB; and
- Gurjar Hindu Union, Ifield, RH11 0AF -1.2 dB.

14.9.87 These predicted increases and decreases may or may not result in increases or decreases in total noise levels at these buildings (or at the community representative locations as discussed above, or elsewhere) depending on the level of noise from other ambient noise sources, in particular road traffic. In all cases the changes in aircraft noise are low and would result in **negligible or minor** effects, which would not be significant.

Ground Noise

Leq Noise Levels

14.9.88 As part of the Project, mitigation in the form of noise barriers has been proposed and has been included in the predicted ground noise levels that are presented in Table 14.9.4 with the difference between the predicted levels and the 2032 baseline shown in Table 14.9.5 along with the worst case magnitude of impact. Day and night periods are modelled and reported separately, as are noise levels when flight are towards the west (westerly operation - runway 26) and when flights are towards the east (easterly operations - runway 08).

Table 14.9.4: Summary of 2032 Ground Noise Predicted Levels including Mitigation (dB)

Descriptor	Location ($L_{Aeq, T}$ dB)											
	Blue Cedars (1)	3 Charlwood Road (2)	Brook farm (3)	Bear and Bunny Nursery (4)	April Cottage (5)	Oakfield Cottage (6)	103 Cheyne Walk (7)	82 The Crescent (8)	Hyders Farm House (9)	Myrtle Cottage (10)	Rowley Farmhouse (11)	Trent House (12)
2032 – Runway 26 Daytime	49	50	56	54	48	55	55	59	50	61	53	50
2032 – Runway 26 Night	48	48	53	51	46	52	51	54	50	59	50	46
2032 – Runway 08 Daytime	55	57	57	55	50	55	51	50	58	60	53	42
2032 – Runway 08 Night	47	50	50	49	45	50	47	47	53	56	50	40

Table 14.9.5: Summary of 2032 Ground Noise Predicted Levels including Mitigation versus 2032 Baseline, Differences (dB)

Descriptor	Location (Difference in $L_{Aeq, T}$ dB)											
	Blue Cedars (1)	3 Charlwood Road (2)	Brook farm (3)	Bear and Bunny Nursery (4)	April Cottage (5)	Oakfield Cottage (6)	103 Cheyne Walk (7)	82 The Crescent (8)	Hyders Farm House (9)	Myrtle Cottage (10)	Rowley Farmhouse (11)	Trent House (12)
2032 – Runway 26 Daytime	4	5	6	4	3	1	1	1	4	3	0	0
2032 – Runway 26 Night	3	4	4	2	2	1	1	0	4	4	0	0
2032 – Runway 08 Daytime	2	3	2	2	1	1	1	0	-1	-1	1	1
2032 – Runway 08 Night	-1	0	-1	0	0	-1	0	-1	-3	-2	1	1
Magnitude of change impact (worst case)	Medium impact at (1), (2), (3), (4), (9) and (10); Low impact at (5), (6), (7), (11) and (12). At all other the remaining locations (8) the impact is negligible											

14.9.89 Table 14.9.4 indicates that Myrtle Cottage is the only area where ground noise levels are predicted to be above the SOAEL at night, with none above the SOAEL in the daytime. Analysis of the noise model indicates that, as represented by this assessment location, there are likely to be approximately 10 residential receptors above the SOAEL.

14.9.90 The significance of the effect at the areas represented by each assessed location is described in the relevant paragraphs below. Where relevant this assessment also considers the results of modelling L_{max} noise levels, discussed in the following section.

14.9.91 It should be noted that the screening effect of residential buildings has not been included in the model as the standard approach for modelling barriers presented in ISO9612:2 is not generally appropriate over larger distances (>1 km) and needs further consideration to ensure the effect is not overestimated. The predicted levels have been conservatively corrected for average wind direction and wind speed noise propagation conditions as detailed in Appendix 14.9.3. Therefore, the assessment results presented are for typical wind conditions but are still worst-case, particularly in terms of the wider area represented by each specific assessment location. Consideration will be given to refining the model to include screening from buildings within the ES.

Maximum Noise Levels

14.9.92 Maximum noise levels (L_{max}) generated by aircraft in the noise model depend only on the aircraft types included in the model, the relative locations of aircraft in relation to receptor locations and the presence of any barriers affecting the propagation. Varying traffic forecast data do not affect the maximum noise levels that might be experienced at a particular location when a particular aircraft is at the closest position on the closest taxiway. For this reason, the calculated maximum levels for the baseline and with Project scenarios are the same for all design years and scenarios, although the numbers of noise events at these levels generally will change.

14.9.93 The results of the predicted maximum levels of aircraft taxi noise, for the baseline and with Project cases, arising at NSRs are shown in Table 14.9.6 (predicted maximum levels are calculated across both day and night periods).

Table 14.9.6: Summary of 2032 Ground Noise Predicted Maximum Levels (dB L_{Amax})

Descriptor	Location (L_{Amax} dB)											
	Blue Cedars (1)	3 Charlwood Road (2)	Brook farm (3)	Bear and Bunny Nursery (4)	April Cottage (5)	Oakfield Cottage (6)	103 Cheyne Walk (7)	82 The Crescent (8)	Hyders Farm House (9)	Myrtle Cottage (10)	Rowley Farmhouse (11)	Trent House (12)
Baseline – 26	60	61	66	66	53	65	63	68	60	71	61	56
Baseline – 08	60	63	65	65	55	67	62	63	69	69	59	51
With Project – 26	59	60	67	63	54	65	63	71	62	71	60	56
With Project – 08	61	63	65	63	55	67	62	66	70	67	59	48

14.9.94 The predictions show that the maximum noise levels occurring for the baseline and with Project cases have the potential to exceed the 65 and 60 dB L_{max} criteria.

14.9.95 The significance of these L_{max} events depends on the number of events above the criteria and the relative change in number of events over the baseline conditions. The number of maximum noise level events exceeding the day and night criteria, for each scenario, are summarised in Table 14.9.7.

Table 14.9.7: Summary of 2032 Baseline and With Project Aircraft Taxiing Events Exceeding L_{Amax} Criteria

Descriptor	Total number of L_{Amax} events											
	Blue Cedars (1)	3 Charlwood Road (2)	Brook farm (3)	Bear and Bunny Nursery (4)	April Cottage (5)	Oakfield Cottage (6)	103 Cheyne Walk (7)	82 The Crescent (8)	Hyders Farm House (9)	Myrtle Cottage (10)	Rowley Farmhouse (11)	Trent House (12)
Baseline – 26 Day (>65 dB)	0	0	0	0	0	0	0	8	0	32	0	0
Baseline – 08 Day (>65 dB)	0	0	0	0	0	23	0	0	8	53	0	0
Baseline – 26 Night (>60 dB)	0	3	22	0	0	8	3	6	0	88	8	0
Baseline – 08 Night (>60 dB)	0	0	0	0	0	11	0	0	21	127	0	0
With Project – 26 Day (>65 dB)	0	0	16	0	0	0	0	21	0	124	0	0
With Project – 08 Day (>65 dB)	0	0	0	0	0	22	0	0	8	30	0	0
With Project – 26 Night (>60 dB)	0	0	77	0	0	9	2	16	22	170	0	0
With Project – 08 Night (>60 dB)	0	5	1	1	0	10	0	0	18	62	0	0

14.9.96 During the night, the maximum number of noise events over 60 dB L_{Amax} would be 170, which is predicted to occur at location 10 (Myrtle Cottage) under westerly operations, an increase in the number of events of 82 over the 2032 future baseline scenario. The number of events during the night at any location where the number of events is predicted to increase is generally more than 10 except for 3 Charlwood Road, Bear and Bunny Nursery and Rowley Farmhouse (locations 2, 4 and 11) (if there are fewer than 10 events predicted to occur above the criteria specified, then the noise impact is considered less likely to give rise to a significant effect). When considered alongside the primary L_{Aeq} metric, the change in L_{Amax} levels and numbers of events is broadly consistent with the predicted changes in L_{Aeq}. The biggest increases in the number of events over 60 dB L_{Amax} during the night occur for westerly (26) operation at Myrtle Cottage.

14.9.97 During the daytime, the maximum number of noise events over 65 dB L_{Amax} is predicted to be 124, which occurs at location 10 (Myrtle Cottage), and this is an increase in the number of events

of 92 over the 2032 future baseline scenario. A lower (but comparable) magnitude of change is also seen at Brook Farm (location 3) where the with Project scenario brings maximum noise levels above the 65 dB daytime threshold.

14.9.98 Maximum noise levels generated by engine ground running (EGR) have been predicted based on current operational procedures and proposed operational procedures, which do not vary significantly apart from the potential number of engine ground run tests. EGR testing takes place at one of four fixed locations on the airport apron including at the eastern and western ends of Taxiway Juliet, on Taxiway Yankee and on the northern runway. Logs of EGR tests indicate that testing times can vary considerably but that longer tests can take up to an hour or so to complete. However, analysis of EGR noise measurements shows that peak levels when engines are run at up to 70% of full power usually only last a couple of minutes and that for the majority of the time noise levels are considerably lower. The predicted noise levels with the Project indicate that levels would only potentially exceed 65 dB L_{max} at three locations due to engine testing and that this is no different to noise levels experienced from this source under the current operational procedures. The predictions also indicate that the highest noise level that could be expected from engine testing would be unlikely to exceed 73 dB L_{max}, which is only slightly higher than the maximum levels produced by taxiing aircraft. EGRs are controlled closely by the airport. Analysis of data shows that runs occur during the operational day and that there are rarely more than two Lmax events generated from this noise source per day. Current records show that there were fewer than 200 EGR tests in 2018 and it is predicted that there would be up to 267 EGR tests by 2038 with the Project, so there would be a number of days per year where no EGR tests would be taking place at all.

14.9.99 In the context of the predicted noise levels from taxiing aircraft, EGR is considered to generate a **negligible** effect, which is not significant. Details of the EGR predictions are included within Appendix 14.9.3 which includes tables of results and information on the source data.

14.9.100 Maximum noise levels generated by APU operation on stands have been predicted, which indicate that levels would only potentially exceed 60 dB L_{max} at up to three locations. Tables of predicted maximum noise levels due to APU operation at each assessment location are included at Appendix 14.9.3.

14.9.101 Internal (GAL) airport reports indicate that APUs are very rarely used on stand and that this occurs less than 3% of the time based on survey information. Forecast traffic data for 2032 indicate that 479 arrivals could be expected in a 24-hour period and, assuming that 3% of these were to use an APU, this would result in fewer than 14 instances of APU usage. Unless this was a result of certain stands with faulty power units, it would be unlikely that all of these events would occur on the same stand and therefore would be unlikely to generate more than 2 or 3 L_{max} events at a particular property. However, if APUs are in use on stands during turnaround of an aircraft, the maximum noise levels could be present for up to an hour at a time.

14.9.102 In order to allow for a small number of Category F size aircraft under dual runway operation, end around taxiways (EATs) have been incorporated into the design. At this stage, the EATs have not been integrated into the main aircraft taxi noise model but the model can be updated to include them for the ES. However, the EATs have been modelled separately based on forecast traffic data for Category F aircraft and it has been confirmed that the additional noise level generated by them would increase L_{Aeq} noise levels by no more than 1 dB at Hyders Farmhouse (location 9) and that at all other locations the change would be less (no more than 0.5 dB). The maximum

noise levels L_{max} generated by the proposed EAT usage would be 2 to 4 dB higher than the currently modelled development case at three locations (1, 2 and 9) but there would be very little change to the predicted numbers of events above the L_{max} criteria since in the 2032 year there are only forecast to be 7-8 Category F movements per day and this is no different between the base and with Project case.

1. Blue Cedars

14.9.103 At Blue Cedars, predicted night-time noise levels are up to 3 dB above the night LOAEL of 45 dB $L_{Aeq,}$ during westerly operation and 2 dB above the night time LOAEL during easterly operation. Predicted night-time noise levels are at least 7 dB below the night SOAEL of 55 dB L_{Aeq}. The magnitude of the night-time change of 3 dB on westerly operations would be medium (see para. 14.4.80 and Table 14.9.5), which is considered to result in a **minor adverse** effect based on the absolute predicted noise levels and maximum noise levels.

14.9.104 During the daytime, the 51 dB L_{Aeq} LOAEL is predicted to be exceeded by a maximum of 4 dB, which is 8 dB below the SOAEL of 63 dB L_{Aeq}. The daytime exceedance of 4 dB above the LOAEL is combined with a medium increase in noise of 4 dB during the day on westerly operations but in the context of the margin below the SOAEL and the maximum noise levels it is considered to be a medium impact resulting in a **minor adverse** effect.

14.9.105 This location is representative of the quieter parts of Charlwood (including the primary school) which are more distant from the main road through the village. This area contains approximately 330 properties, and as a worst case the conclusions presented above could be considered to apply to the residential properties in this area. In practice impacts and resultant effects could be lower at some of the properties in this area due to localised acoustic screening – this will be further addressed in the ES.

2. 3 Charlwood Road

14.9.106 At 3 Charlwood Road, predicted night-time noise levels exceed the night LOAEL of 45 dB $L_{Aeq,}$ by a maximum of 5 dB, and this is in the context of a worst-case predicted increase in night-time ground noise of 4 dB resulting in a medium magnitude of impact. Predicted night-time noise levels are at least 5 dB below the night-time SOAEL of 55 dB L_{Aeq}. The highest predicted night-time noise for this location is under easterly operations which occur less frequently than westerly operations. The predicted night-time noise is slightly higher for this location than it is for Blue Cedars but in the context of the SOAEL and the maximum levels, this is still considered to be a medium impact resulting in a **minor adverse** effect.

14.9.107 During the daytime, the 51 dB L_{Aeq} LOAEL is predicted to be exceeded by a maximum of 6 dB under easterly operations, which is 6 dB below the SOAEL of 63 dB L_{Aeq}. The Project would result in a change of up to 5 dB in the daytime noise levels, resulting in a medium magnitude of impact. Given the level below SOAEL and the maximum noise levels, the daytime noise impact is considered to result in a **minor adverse** effect.

14.9.108 This location is representative of the busier area of Charlwood, close to the main road through the village, which contains approximately 230 properties, and the conclusions presented above could be considered to apply to all residential properties in this area. In practice, impacts and resultant effects could be lower at some of the properties in this area due to localised acoustic screening – this will be further addressed in the ES.

3. Brook Farm

14.9.109 At Brook Farm, predicted night-time noise levels exceed the night LOAEL of 45 dB L_{Aeq} by a maximum of 8 dB, which is 2 dB below the SOAEL of 55 dB L_{Aeq}. This property would experience a predicted increase in night-time ground noise of up to 4 dB (medium magnitude of impact) along with up to 77 night-time L_{max} events exceeding the 60 dB criterion. Assessed overall, the night-time noise effect is therefore considered to be a **moderate adverse** significant effect.

14.9.110 During the daytime the 51 dB L_{Aeq} LOAEL is predicted to be exceeded by a maximum of 6 dB, and predicted levels are at least 6 dB below the SOAEL of 63 dB L_{Aeq}. There are predicted changes in ground noise level of 4 and 6 dB during the day resulting in a medium and high magnitude of impact. During the daytime there would be a maximum of 16 events above the daytime 65 dB L_{Amax} criterion at Brook Farm and this is in the context of no events above the criterion for the baseline scenario. It is therefore considered that due to the predicted change in L_{Aeq} and L_{Amax} ground noise levels with and without the Project, the daytime noise impact would result in a **moderate adverse** significant effect.

14.9.111 This location is one of approximately 50 properties on Charlwood Road to the north west of the airport, but the conclusions presented above do not necessarily apply to all residential properties in this area as some receive greater benefits from the noise bund resulting in lower predicted noise levels. Therefore, impacts and resulting effects may be lower at some of the properties in this area. This will be further addressed in the ES. It should be noted that this area of approximately 50 properties includes the Bear and Bunny nursery but this is considered separately below as it is not residential.

4. Bear and Bunny Nursery

14.9.112 The nursery is only in use during daytime hours and therefore the night-time effects have not been assessed.

14.9.113 During the daytime the 51 dB L_{Aeq} LOAEL is predicted to be exceeded by a maximum of 4 dB, which is 8 dB below the SOAEL of 63 dB L_{Aeq}. There would be a medium magnitude of impact from the change in predicted levels on westerly operations, and a low change on easterly operations, but the maximum noise levels do not exceed the 65 dB L_{Amax} criterion. The daytime noise impact is considered to result in a **minor adverse** effect due to the reduced maximum noise levels compared with Brook Farm.

14.9.114 This location is representative only of the nursery.

5. April Cottage

14.9.115 At April Cottage, predicted night-time noise levels are up to 1 dB above the night LOAEL of 45 dB $L_{Aeq,}$ and the property would experience very little change in the predicted noise level resulting in a low magnitude of impact. This affects a low number of properties. The night noise impact is therefore considered to result in a **negligible** effect.

14.9.116 During the daytime the 51 dB L_{Aeq} LOAEL is not predicted to be exceeded and there is a potential increase in ground noise of up to 2 dB resulting in a low magnitude of impact. The daytime noise impact is therefore considered to result in a **negligible** effect.

14.9.117 This location is representative of properties further to the north of Charlwood Road that experience a quieter noise environment than those represented by Brook Farm. The assessment

location is within an area that contains approximately 20 properties, and the conclusions presented above are likely to apply to the other residential properties in the vicinity.

6. Oakfield Cottage

14.9.118 At Oakfield Cottage, predicted night-time noise levels exceed the night LOAEL of 45 dB L_{Aeq} by a maximum of 7 dB for westerly operations but the property would experience a change of 1 dB in ground noise levels resulting in a negligible magnitude of impact. The night noise impact is therefore considered to result in a **negligible** effect.

14.9.119 During the daytime, the 51 dB L_{Aeq} LOAEL is predicted to be exceeded by 4 dB which is 8 dB below the SOAEL of 63 dB L_{Aeq}. A change in ground noise of 1 dB is expected, resulting in a negligible magnitude of impact. The ground noise impact is therefore considered to result in a **negligible** effect.

14.9.120 This location is representative of Povey Cross, encompassing an area that contains approximately 220 properties, and as a worst-case assessment the conclusions presented above are considered to apply to the residential properties in the vicinity. In practice, impacts and resultant effects would be lower at some of the properties in this area due to localised acoustic screening. This will be further addressed in the ES.

7. 103 Cheyne Walk

14.9.121 At 103 Cheyne Walk, predicted night-time noise levels are up to 6 dB above the night LOAEL of 45 dB $L_{Aeq,}$ but there is little or no predicted change in night ground noise, and the magnitude of impact would be negligible. The night noise impact is therefore considered to result in a **negligible** effect.

14.9.122 During the daytime, the 51 dB L_{Aeq} LOAEL is predicted to be exceeded by up to 4 dB. There is a predicted increase in ground noise level of 1 dB or less resulting in a negligible magnitude of impact. The ground noise impact is therefore considered to result in a **negligible** effect.

14.9.123 This location is representative of properties in the Horley area that are closer to the main roads and therefore busier and noisier than properties more distant from major road traffic noise sources. This area contains approximately 560 properties, and as a worst case, the conclusions presented above are considered to apply to the residential properties in the vicinity. In practice, impacts and resultant effects would be lower at some of the properties in this area due to localised acoustic screening. This will be further addressed in the ES.

8. 82 The Crescent

14.9.124 At 82 The Crescent, predicted night-time noise levels exceed the night LOAEL of 45 dB L_{Aeq} by a maximum of 9 dB, and the property would experience a predicted decrease in night ground noise of 1 dB, resulting in a negligible magnitude of impact. Predicted night-time noise levels are at least 1 dB below the night SOAEL of 55 dB L_{Aeq}. Under easterly operations, the predicted levels are slightly lower than the 2032 baseline levels and the night noise impact is considered to result in a **negligible** effect.

14.9.125 During the daytime the 51 dB L_{Aeq} LOAEL is predicted to be exceeded by a maximum of 8 dB, and would be at least 4 dB below the SOAEL of 63 dB L_{Aeq}. Predicted ground noise levels would increase by less than 1 dB with the Project resulting in a negligible magnitude of impact. Although there are some increases in the number of maximum noise events above the daytime

and night time L_{Amax} criteria, it is unlikely that these would be perceived since predicted 2032 noise levels are at least 1-2 dB below the measured overall baseline noise levels due to high levels of road traffic noise. The ground noise impact is considered to result in a **negligible** effect.

14.9.126 This location is representative of an area to the north east of Riverside Garden Park that contains approximately 840 properties, and as a worst case the conclusions presented above are considered to apply to the residential properties in the vicinity. In practice, impacts and resultant effects would be lower at some of the properties in this area due to localised acoustic screening. This will be further addressed in the ES.

9. Hyders Farm House

14.9.127 At Hyders Farm House, predicted night-time noise levels are a maximum of 8 dB above the night LOAEL of 45 dB $L_{Aeq,}$ and the property would experience a predicted change in night ground noise ranging from -3 to +4 dB, resulting in a medium magnitude of impact during westerly operations. Predicted night-time noise levels are at least 2 dB below the night SOAEL of 55 dB L_{Aeq}. This property is representative of a small number of residential properties but it should be noted that night time L_{Amax} increases above the 60 dB threshold resulting in 22 maximum noise events exceeding this night time criterion where there would be none with the baseline. The night noise impact is therefore considered to result in a **moderate adverse** significant effect.

14.9.128 During the daytime the 51 dB L_{Aeq} LOAEL is predicted to be exceeded by a maximum of 7 dB, and would be 5 dB below the SOAEL of 63 dB L_{Aeq}. Predicted ground noise levels change by just under 4 dB for westerly operations, resulting in a medium magnitude of impact. The number of maximum noise events above the daytime L_{Amax} criterion decrease compared with the baseline and overall the ground noise impact is therefore considered to result in a **minor adverse** effect.

14.9.129 This location is representative of an area to the south west of the airport that contains approximately 30 properties, and the conclusions presented above are considered likely to apply to the residential properties in this vicinity.

10. Myrtle Cottage

14.9.130 At Myrtle Cottage, predicted night-time noise levels are 14 dB above the night LOAEL of 45 dB $L_{Aeq,}$ and up to 4 dB over the night SOAEL of 55 dB L_{Aeq}. This location would experience a change in night-time noise of -2 dB to +4 dB, resulting in a medium magnitude of impact. The night-time noise impact is therefore considered to result in a **moderate adverse** significant effect due to the predicted exceedance of the SOAEL.

14.9.131 During the daytime the 51 dB L_{Aeq} LOAEL is predicted to be exceeded by a maximum of 10 dB, and to be 2 dB below the SOAEL of 63 dB L_{Aeq}. The predicted change in ground noise level is no more than 4 dB resulting in a medium magnitude of impact. This location is not densely populated and there are also notable decreases in the number of maximum noise events exceeding the daytime L_{Amax} criterion which means that the ground noise impact is considered to result in a **minor adverse** effect.

14.9.132 This location is representative of an area of buildings in the locality of Poles Lane which contains approximately 10 properties, and the conclusions presented above are likely to apply to the residential properties in this vicinity.

11. Rowley Farmhouse

14.9.133 At Rowley Farmhouse, predicted night noise levels exceed the night LOAEL of 45 dB L_{Aeq}, by up to 5 dB and the property would experience a change in night ground noise of 1 dB, resulting in a negligible magnitude of impact. The night-time noise impact is therefore considered to result in a **negligible** effect.

14.9.134 During the daytime the 51 dB L_{Aeq} LOAEL is predicted to be exceeded by up to 2 dB with a change of 1 dB generating a negligible magnitude of impact. The ground noise impact is therefore considered to result in a **negligible** effect.

14.9.135 This location is representative of an area on a hill to the south of the airport that contains approximately 10 properties, and the conclusions presented above are likely to apply to all residential properties in this vicinity.

12. Trent House

14.9.136 At Trent House, predicted night-time noise levels are 1 dB above the night LOAEL of 45 dB $L_{Aeq,}$ and there would be up to 1 dB of change in night-time ground noise levels resulting in a negligible magnitude of impact. The night-time noise impact is therefore considered to result in a **negligible** effect.

14.9.137 During the daytime the 51 dB L_{Aeq} LOAEL would not be exceeded and noise change is predicted to be 1 dB resulting in a negligible magnitude of impact. The ground noise impact is therefore considered to result in a **negligible** effect.

14.9.138 This location is representative of an area of Balcombe Road that contains approximately 90 properties, and the conclusions presented above are considered likely to apply to the residential properties in this vicinity. In practice, impacts and resultant effects would be lower at some of the properties in this area due to localised acoustic screening. This will be further addressed in the ES.

Overall Results

14.9.139 The assessment has considered L_{max} and L_{eq} noise modelling results and has shown the contributions of maximum noise levels from APU, EGR and EAT usage are all negligible in comparison to taxiing aircraft.

14.9.140 The results show predicted ground noise effects would not be significant (negligible or minor) at 9 of the representative receptors studied with moderate adverse effects at three receptors. The effects rated as moderate are considered significant and these are predicted in the Charlwood area and the area immediately south of the airport (location 9, Hyders Farm and location 10, Myrtle Cottage), at a total of approximately 90 properties. These are conservative estimates that will be further refined in the ES.

14.9.141 The majority of the NSRs around the airport perimeter that may be adversely impacted by ground noise are within the areas covered by the current or proposed noise insulation scheme (NIS), as shown in Figure 14.8.1. The noise insulation available would reduce noise levels inside properties to mitigate the predicted impacts. The up to 10 properties where the SOAEL may be exceeded are within or close to the NIS Inner Zone boundary. The Inner Zone NIS will be modified if necessary when the assessment is completed to include these properties if necessary, so that significant effects on heath and quality of life are avoided.

Road Traffic Noise

14.9.142 The traffic noise changes from roads, which include those that are physically affected by the Project, ie around the North and South Terminal roundabouts, have been modelled, and the results are discussed below.

14.9.143 The results of modelling of traffic noise in 2032 with the noise barrier mitigation described above, are presented in the following figures:

- Figure 14.9.32 – 2032 Traffic Noise Levels with Project.
- Figure 14.9.33 – 2032 Traffic Noise Levels with Project with Mitigation.

14.9.144 Table 14.9.8 shows $L_{A10,18\ hour}$ dB road traffic noise predictions at a selection of receptor locations representing the closest nearby communities/dwellings to the Project (see Figure 14.6.12). Full results are provided in Appendix 14.9.4. Scenarios for future baseline (business as usual (BAU)), have been included. A comparison of the noise levels with the Project against the future baseline has been carried out.

14.9.145 Predicted noise changes have been reported to one decimal place in order to show clearly which impact category applies to the stated noise change. Although decibels are often quoted as integers, quoting to one decimal place allows a change to be compared to the noise change boundary more precisely. For example a noise change of 1.2 dB is clearly higher than the integer boundary value for low impacts.

Table 14.9.8: Road Traffic Noise at Key Receptors (Short Term DMRB Assessment, 2032)

Scenario	Receptor ID/Description, $L_{A10,\ 18\ hour}$ dB Results (Façade)						
	NSR1 The Crescent East	**NSR2 The Crescent West**	**NSR3 Woodroyd Gardens**	**NSR4 Cheyne Walk**	**NSR5 Longbridge Road East**	**NSR9 B2036 Balcombe Road**	**NSR12 Riverside Garden Park South[2]**
BAU	69.2	64.9	69.8	71.4	70.5	74.3	64.0
With Project[1]	69.3	64.7	66.7	68.9	71.0	72.8	63.5
DMRB Short-term Assessment (With Project – BAU Difference in 2032)	0.1	-0.2	-3.1	-2.5	0.5	-1.5	-0.5

[1] Scenario contains noise mitigation as described in Section 14.8.

[2] Noise-sensitive receptors represent open park areas, and results are presented as free-field values.

14.9.146 Figure 14.9.33 provides a noise contour map showing the difference in traffic noise levels predicted with the Project compared to without in 2032.

14.9.147 Comparing the traffic noise levels with the Project in 2032 to the future baseline scenario in 2032 shows predicted reductions in noise at the majority of residential receptors and in the Riverside Garden Park. This is a result of the noise mitigation that has been incorporated into the highway design.

14.9.148 Noise mitigation is not practicable in the area near the Longbridge roundabout, where there are small increases in noise level predicted to affect a small number of receptors. More detailed results at all fourteen receptor locations, along with results without mitigation can be found in Appendix 14.9.4.

14.9.149 The predicted noise levels above are daytime façade values of $L_{A10,\ 18\ hour}$, with the exception of the Riverside Garden Park which are presented as free-field noise levels. Noise levels that exceed 68 dB would exceed the SOAEL. It can be seen that although the noise levels at receptors 1, 4, 5 and 9 are above the SOAEL threshold, they were also above it in the base case, and therefore, do not count as significant on this basis. The DMRB states that "*where any do-something absolute noise levels are above the SOAEL, a noise change in the short term of 1.0dB or over results in a likely significant effect*." The noise increases in all cases are less than 1.0 dB. It can also be noted that noise levels at receptor 3 are above the SOAEL threshold without the Project and below with the Project's implementation, with a noise reduction of 3.1 dB. It can therefore be concluded that a medium magnitude positive noise change at receptor 3 would also result in a likely significant effect.

14.9.150 The DMRB does not specifically say that noise levels below LOAEL are not significant, however, the interpretation has been made that where noise levels are below or equal to LOAEL, the effect cannot be significant, and only noise changes above this level need to be considered. Since the predicted noise levels are above LOAEL, the next step in the assessment is to consider the changes in noise as a result of the new or altered parts of road network. The changes in traffic noise are generally reductions. A reduction of 3.1 dB at Receptor 3: Woodroyd Gardens indicates a medium beneficial impact. Reductions of between 1 and 3 dB, which indicates a low beneficia**l** noise impact, are predicted at Receptor 4: Cheyne Walk and at Receptor 9: B2036 Balcombe Road. Other noise changes are less than 1 dB and would be negligible. As previously stated, all medium impacts are classed as giving rise to significant effects, and in this case the low magnitude impacts at Receptors 4: Cheyne Walk, and 9: B20356 Balcombe Road are also considered significant positive impacts, because the absolute predicted noise levels exceed the SOAEL value.

14.9.151 Noise levels in the Riverside Garden Park are already high and have a negative impact on the park users. The Project would be designed to include noise barriers that will offset the traffic noise effects of the Project and result in a small noise reduction in the park.

14.9.152 Overall, with the inclusion of the noise barriers described in Section 14.8, the road modifications are expected to reduce noise levels slightly and result in a low beneficial impact, with some receptors experiencing a medium beneficial impact. An assessment of the numbers of properties affected by the difference noise changes will be undertaken and reported in the ES, and is likely to conclude that the benefits are of **negligible or minor significance** in most areas with some **moderate significant** benefits in small areas where the highest baseline noise levels are predicted to reduce.

Other Areas

14.9.153 Basic Noise Levels (BNL) were calculated for roads on the network away from the highway elements of the Project that would not be subject to physical works in 2032 (the year of opening of the road alterations). The results of these predictions identified that noise changes would be small on most roads, with noise changes greater than 1 dB predicted on very few minor road links due to the Project.

14.9.154 The DMRB states that it can be sufficient to define a study area within 50 metres of road links that are not physically changed or the Project, where a BNL change of more than 1.0 dB is likely to occur. The majority of road links that were identified with noise changes greater than 1 dB were within industrial areas to the south of the South Terminal further than 50 metres from receptors and therefore the roads were not close enough to the receptors to be included within the study area. A single road link, on Charlwood Road and Ifield Avenue in the Langley Green area is predicted to experience a short-term change in noise level of 1.1 dB. Approximately 30 dwellings in the front row of properties lie within 50 m of the road experience a short-term change in noise.

14.9.155 The DMRB provides guidance on assessing the impact of noise for motorways and all-purpose trunk roads, not specifically smaller roads which are less likely to dominate the total noise levels at NSRs. The predicted noise changes will be studied in more detail in the ES, but the overall noise effects are likely to be **Negligible to Minor adverse**.

Design Year: 2038

Air Noise

14.9.156 Appendix 14.9.2 provides the predicted noise contour areas and populations. In all cases, noise contours are smaller and levels forecast for 2038 with the Project are lower than those forecast for 2032 with the Project (on average by $L_{eq,\ 16\ hour,}$ day 0.6 dB and $L_{eq,\ 8\ hour}$ night 0.5 dB). This is because the growth in air traffic forecast from 2032 to 2038 is not sufficient to offset the reduction in noise levels from the aircraft fleet predicted over this period. The noise contours in 2038 are also smaller than in 2019, so that under the slower transition fleet case if noise contours do rise above 2019 levels when they peak in 2032, they would fall back below 2019 levels by 2038.

14.9.157 Noise contours are provided for 2038, as listed below. Noise contour areas and population for all noise metrics for 2038 are reported in Appendix 14.9.2.

- Figure 14.9.34 shows the 2038 with Project $L_{eq,\ 16\ hour}$ day noise contours.
- Figure 14.9.35 shows the 2038 with Project $L_{eq,\ 8\ hour}$ night noise contours.
- Figure 14.9.36 shows the 2038 with Project N65 day noise contours.
- Figure 14.9.37 shows the 2038 with Project N60 night noise contours.
- Figure 14.9.38 shows the 2038 with Project L_{den} annual noise contours.
- Figure 14.9.39 shows the 2038 with Project L_{night} annual noise contours.

14.9.158 A detailed assessment of the 2038 effects is not necessary because the effects of the Project would be lower than in 2032 and any mitigation provided for the impacts in 2032 would also be adequate in 2038. The noise envelope proposed (see Section 14.8) acknowledges the predicted reduction of noise contour areas after 2032 and proposes a mechanism to give certainty that noise contours will be smaller by 2038 and beyond.

Ground Noise

14.9.159 The modelling of predicted ground noise for the Project in the 2038 design year and the associated assessment of effects are presented in Appendix 14.9.3.

Road Traffic Noise

14.9.160 The DMRB does not require an assessment of road traffic noise in 2038. Instead road traffic noise 15 years after the opening of the roads associated with the Project (2047) has been assessed, consistent with the DMRB. This is reported below.

Year 2047

Air Noise

14.9.161 Appendix 14.9.2 Section 5 contains details of air noise levels contour areas and populations predicted in 2047, as summarised above in the main air noise assessment section under the Interim Year 2032 heading. This shows the trends in air noise levels predicted in 2019, 2029, 2032, 2038 and 2047 and demonstrates that noise levels would be lower in 2047 than in 2032. This is because fleet transition to quieter new generation aircraft would continue beyond 2038 offsetting the projected increase in air traffic, in all cases.

Ground Noise

14.9.162 Levels of ground noise and impacts of ground noise with the Project in 2047 would be lower than those in 2038 and have not therefore been assessed.

Road Traffic Noise

New or Altered Roads

14.9.163 The DMRB requires an assessment of the traffic noise changes from roads in the Long Term: Do Minimum Opening Year (DMOY) (ie the situation in the opening year of the highway scheme without the Project) versus Do Something Future Year (DSFY) (ie the situation 15 years after opening with the Project and associated traffic changes). Non-project noise changes (ie Do Minimum Future Year (DMFY) compared against DMOY) have also been considered. Similar noise changes in the long term with the Project and in the Do Minimum scenario can indicate changes are not likely due to the Project, therefore not indicating a likely significant effect. These scenarios have been modelled, and the results are discussed below.

14.9.164 The results of modelling of traffic noise in 2047 with the noise barrier mitigation described above, are presented in the following figures:

- Figure 14.9.40 – 2047 Traffic Noise Levels Business as Usual;
- Figure 14.9.41 – 2047 Traffic Noise Levels with the Project with Mitigation.

14.9.165 Table 14.9.9 shows $L_{A10,18\ hour}$ road traffic noise predictions at a selection of receptor locations representing the closest nearby communities/dwellings to the Project (see Figure 14.6.17), as required for the DMRB long term assessment. Full results are provided in Appendix 14.9.4.

14.9.166 Predicted noise changes have also been reported to one decimal place in order to show clearly which impact category applies to the stated noise change.

Table 14.9.9: Road Traffic Noise at Key Receptors (Long Term DMRB Assessment)

Scenario	Receptor ID/Description, $L_{A10, 18\ hour}$ dB Results (Façade)						
	NSR1 The Crescent East	NSR2 The Crescent West	NSR3 Woodroyd Gardens	NSR4 Cheyne Walk	NSR5 Longbridge Road East	NSR9 B2036 Balcombe Road	NSR12 Riverside Garden Park South[2]
BAU 2032	69.2	64.9	69.8	71.4	70.5	74.3	64.0
BAU 2047	69.5	65.2	70.1	71.6	70.7	74.5	64.3
With Project[1] 2047	69.6	65.0	66.9	69.2	71.4	73.0	63.8
DMRB Long-term Assessment (With Project 2047 – BAU 2032 Difference)	0.4	0.1	-2.9	-2.2	0.9	-1.3	-0.2
DMRB Non-scheme Assessment (BAU 2047 – BAU 2032 Difference)	0.3	0.3	0.3	0.2	0.2	0.2	0.3

[1] Scenario contains noise mitigation as described in Section 14.8.

[2] Noise-sensitive receptors represent open park areas, and results are presented as free-field values.

14.9.167 Figure 14.9.42 provides a noise contour map showing the difference in traffic noise levels predicted with the Project in 2047 with mitigation versus Baseline Traffic Noise Levels in 2032.

14.9.168 Comparing the predicted traffic noise levels from the Project in 2047 to the baseline scenario in 2032, reductions are predicted at the majority of residential receptors and in the Riverside Garden Park. Changes as a result of non-Project traffic increases have also been predicted for these years, and the predicted increases were found not to have a significant influence on the results, so that these predicted noise reductions were shown to be as a result of the Project.

14.9.169 More detailed results at all fourteen receptor locations, along with results without mitigation can be found in Appendix 14.9.4.

14.9.170 The changes in traffic noise in Table 14.9.9 show that for the Project, the long term noise changes at all receptors would be less than 3 dB and would therefore be negligible.

14.9.171 Overall, with the inclusion of the noise barriers described in Section 14.8, the road modifications are expected to reduce noise levels slightly, resulting in a negligible impact. An assessment of the

numbers of properties affected by the different noise changes will be undertaken and reported in the ES, and is likely to conclude that the benefits are of **negligible significance** in most areas in the long term.

Other Areas

14.9.172 Basic Noise Levels (BNL) (ie noise levels at 10 m from the carriageway) were calculated for roads elsewhere on the network that are not subject to physical works from the Project in the year of opening (2032). The BNLs were also calculated for 2047 (the situation 15 years after opening with the Project), therefore enabling an assessment of potential long-term effects of the Project in the wider area, as required by the DMRB. The change in BNL between 2032 and 2047 without the Project was also calculated to enable the (long-term) effect of non-Project traffic growth in the area to be taken into account when indirect noise effects of the Project on the wider road network are assessed.

14.9.173 The results of these predictions identified that noise changes in the long-term would be small on most roads, with noise changes greater than 3 dB predicted on a small number of minor road links well away from the Project area. However, in all these cases the noise changes were identified in the long-term with or without the Project, indicating the changes due to the Project in the long-term are not significant.

14.10. Potential Changes to the Assessment as a Result of Climate Change

14.10.1 Changes in the climate could affect aircraft performance and hence climb rates which could alter noise levels on the ground. However, such effects are likely to be small.

14.10.2 Changes in the climate could affect wind speeds and direction and hence runway modal split. The results of modelling runway modal splits from 50% to 90% westerly are given in Table 6.1.1 of Appendix 14.2 and show variations in contour areas of 3% for daytime $L_{eq,\ 16\ hour}$ 51 dB contours and 2% for night-time $L_{eq,\ 8\ hour}$ 45 dB contours. The variation in contour populations are 22% for daytime $L_{eq,\ 16\ hour}$ 51 dB contours and 5% for night-time $L_{eq,\ 8\ hour}$ 45 dB contours. It is not known to what extent climate change could affect runway modal split, but this analysis suggests that in itself it is not likely to have major changes in the noise impacts of the Project.

14.10.3 Changes in weather could affect the propagation of noise from airborne aircraft to the ground, and hence noise levels at receptors. Modelling an increase in summer temperature of 4 degrees Celsius (with a corresponding reduction in relative humidity of 8%) showed noise levels within 1 dB compared to current weather conditions, so these effects are likely to be insignificant.

14.10.4 Changes in climate could increase heatwaves in the summer months and lead to more residents opening windows more frequently for cooling in the day and at night. This could lead to greater impacts in terms of disturbance to indoor activities and sleep. The proposed enhanced noise insulation scheme for homes within the forecast $L_{eq,\ 16\ hour}$ 54 dB daytime air noise contour includes acoustic ventilators to allow residents to keep windows closed. The scheme is voluntary, and it may be that climate change would increase uptake, allowing for greater mitigation of noise impacts.

14.10.5 Any change in the climate may affect the amount of time that APUs are running as they may be required for greater cooling and or warming of the aircraft as they taxi. As noted above, APU noise is considered to be insignificant in relation to the engine noise when taxiing, and when the

aircraft are at the stands they generally do not operate the APU as they are connected to Ground Power Units (GPUs). Any change, therefore, in the use of the APU as a result of climate change, assuming there is no increase in its use at the stands, would be insignificant in terms of the assessment and results presented here.

14.10.6 Potential changes to the climate in a future baseline scenario would not affect the traffic noise assessment. The CRTN method does not take into account atmospheric conditions and temperature to calculate predicted noise levels. Whilst wet roads are noisier than dry roads, and climate change may change the pattern of rainfall in the future, the CRTN methodology does not consider the effect of wet roads as a result the assessment would not be affected by climate change.

14.11. Cumulative Effects

Combined Effects

14.11.1 This section considers the combined effects of noise and vibration from the various parts of the Project which are reported separately in the chapter as defined in paragraph 14.1.1, ie:

- construction noise;
- air noise;
- ground noise; and
- road traffic noise.

14.11.2 As there is no reliable means of quantitatively assessing the overall noise effect resulting from different noise sources, this section considers the overall effect of noise from combined sources qualitatively. This takes account of factors including the following:

- whether the effects from the different sources would be likely to occur at the same time, or the same time of day;
- the duration of any combined effects;
- whether one effect dominates or whether effects might be additive; and
- whether the effects on individual receptors are likely to be on the same façade of the property.

14.11.3 During construction, there is potential for short term effects from construction noise and vibration. The construction noise assessment criteria take account of baseline noise levels. Impacts of the Project due to air, ground and road traffic noise would not arise until after the Project is operational, ie after 2029. Some construction works would continue after this time. However, the changes in air, ground and road traffic noise are small compared to the likely levels of construction noise that are required to generate significant short term effects at particular receptors. So combined noise effects are likely to be minor.

14.11.4 During operation, there is potential for air, ground and traffic noise impacts to combine. Road traffic noise increases near the highways improvements would be mitigated within the design, so mitigating the potential for combined impacts in the Horley area next to the highway works. Traffic noise increases elsewhere are expected to be small so that combined traffic noise effects are expected to be minor.

14.11.5 There is potential for ground noise and air noise impacts to combine at receptors in the vicinity of the airport where ground noise impacts are predicted. However, all these properties would be included within the NIS which would be designed to mitigate air and ground noise effects.

14.11.6 Vibration effects during construction will be assessed in the ES, however, they are likely to be short-lived and in localised areas only, making combined effects unlikely.

14.11.7 This assessment will be updated in ES based on the updated construction, air, ground and road traffic noise assessments.

Cumulative Effects

Zone of Influence

14.11.8 The zone of influence (ZoI) for noise has been identified based on the spatial extent of likely effects, which in general is the area within which noise levels above the LOAEL are expected. The largest of these are for air noise and are the 2032 with Project $L_{eq,\ 16\ hour}$ 51 dB and $L_{eq,\ 8\ hour}$ night contours shown in Figures 14.9.1 and 14.9.7.

Screening of Other Developments and Plans

14.11.9 The cumulative effect of additional road traffic noise from other developments is included within the assessment, as the traffic noise modelling is based on traffic forecasts that take these developments into account (see Chapter 12: Traffic and Transport).

14.11.10 It is possible for concurrent construction works to have cumulative impacts on particular NSRs. However, in practice such effects are rare because for an additive noise effect to arise, the works have to arise at the same time on the same day, affecting the same façade of a noise sensitive building. It is more common for noise disturbance from adjacent sites to add to the duration of the disturbance. At this stage it is not possible to consider the timing of adjacent developments in this level of detail, but overlap of noisy construction works sufficiently nearby to sensitive receptors to add significantly to the predicted noise levels are unlikely and hence cumulative effects are unlikely. The ES will give further consideration to potential for cumulative construction noise effects when the programme of works will be more accurately understood.

14.11.11 The Cumulative Effect Assessment (CEA) takes into account the impact associated with the Project together with other developments and plans. The projects and plans selected as relevant to the CEA presented within this chapter are based upon the results of a screening exercise undertaken as part of the 'CEA short list' of developments (see Appendix 19.4.1). Each development on the CEA long list has been considered on a case by case basis for scoping in or out of this chapter's assessment based upon data confidence, effect-receptor pathways and the spatial/temporal scales involved.

14.11.12 In undertaking the CEA for the Project, it is important to bear in mind that the likelihood of other developments and plans being constructed varies depending on how far along the planning process they are. For example, relevant developments and plans that are already under construction are likely to contribute to a cumulative impact with the Project (providing impact or spatial pathways exist), whereas developments and plans not yet approved or not yet submitted are less certain to contribute to such an impact, as some may not achieve approval or may not ultimately be built due to other factors. For this reason, all relevant development and plans considered cumulatively alongside the Project have been allocated into 'Tiers', reflecting their

current stage within the planning and development process. Appropriate weight is therefore given to each Tier in the decision-making process when considering the potential cumulative impact associated with the Project (eg it may be considered that greater weight can be placed on the Tier 1 assessment relative to Tier 2). Further details of the screening process for the inclusion of other developments and plans in the short list and a description of the Tiers is provided in Chapter 19: Cumulative Effects and Inter-relationships.

14.11.13 The specific developments scoped into the CEA for noise and vibration are outlined in Table 14.11.1. Only residential developments of at least 50 units and other noise sensitive developments have been included. All projects are Tier 1. The developments included as operational in this assessment have been commissioned since the baseline studies for this Project were undertaken and as such were excluded from the baseline assessment. Full details of each of the developments are provided in Appendix 19.4.1.

Table 14.11.1: List of Other Developments and Plans considered within CEA

Description of Development/Plan	Planning Phase	Distance from the Project
CR/2016/0083/ARM: 249 dwellings	Permitted	2.1 km
CR/2016/0962/ARM: 151 dwelling	Permitted	2.2 km
CR/2016/0114/ARM: 75 dwellings	Permitted	2.1 km
CR/2016/0780/ARM: 225 dwellings	Permitted	2.2 km
CR/2018/0544/OUT: 150 dwellings	No decision	2.1 km
CR/2018/0894/OUT: 185 dwellings	No decision	1.3 km
CR/2017/0997/OUT: 182 dwellings	Permitted	3.3 km
04/02120/OUT: Approximately 1510 dwellings	Permitted	5 km
2019/548/EIA: 360 dwellings	No decision	1.5 km
2018/2567: 51 dwellings	Permitted	1.9 km
DC/17/2481: 227 dwellings	Permitted	6.3 km
13/04127/OUTES: 500 dwellings	Permitted	2.7 km
CR/2015/0552/NCC: Forge Wood, up to 1900 dwellings	Allocated in Crawley Local Plan 2030 (Adopted)	1.6 km
CR/2019/0542/FUL: up to 152 apartments	Unknown	4 km
CR/2015/0718/ARM: up to 169 dwellings	Allocation within Crawley Local Plan 2021-2037 (Regulation 19).	1.6 km
DC/10/1612: approximately 2,500 dwellings	site allocated in the Horsham DC Planning Framework (Adopted 2015).	6.7 km
EIA/20/0004: 3,250 to 4,000 homes	EIA Scoping for West of Ifield	1.5 km
13/04127/OUTES: 500 homes	Outline planning application	2.7 km

Description of Development/Plan	Planning Phase	Distance from the Project
Tinsley Lane: 150 dwellings	Permitted	2.2 km
Land north of Rosemary Lane: 150 housing units	Housing & Traveler Site Plan (Adopted 2014)	1.4 km
Land east of Ifield Road: 150 housing units	Housing & Traveler Site Plan (Adopted 2014)	1.4 km
Land adjacent to Desmond Anderson: 150 dwellings	Housing allocation	6.6 km
Land to the southeast of Heathy Farm, Balcombe Road: 150 dwellings	Housing allocation	4.1 km
Telford Place/ Haslett Avenue: 300 dwellings	Town Centre Key Opportunity Site	5 km
Crawley College: 400 dwellings	Town Centre Key Opportunity Site	4.7 km
Land at Plough Road and Redehall Road, Smallfield; 160 residential units	Proposed Plan	3.6 km
Land North of Plough Road, Smallfield: 120 residential units	Proposed Plan	4.0 km
Land West of Reigate Road, Hookwood Site Allocation Policy SA42: 450 dwellings and two gypsy and travelers pitches	Site identified in the Reg 18 consultation draft local plan (Feb 2020 to March 2020)	0.3 km
Heathrow Third Runway	PEIR 2019	37 km

Cumulative Effects Assessment

14.11.14 The majority of the development sites, particularly Tier 1, are to the south of the airport, and although they are within a short distance, in most cases these fall within the lower air noise contour bands, and in areas where the Project would slightly reduce air noise levels. Nonetheless, there is potential for noise impacts on the future residents of these developments as a result of Gatwick's operations which in some cases would increase or decrease due to the Project. The site West of Ifield (EIA/20/0004) is a large site that could introduce 3,250 to 4,000 homes to a site partly within the airports LOAEL noise contours.

14.11.15 In seeking permission to develop sites for residential use in noisy areas, in accordance with the NPPF and other policy, developers are required to consider the potential for noise impacts on future residents and to design the developments with suitable mitigation accordingly. Local planning authorities have a duty to enforce this requirement though through the local planning application process. Professional Planning Guidance on Planning and Noise (2017), local plans (including supplementary planning guidance, eg the Draft Crawley Borough Local Plan 2021-2037 Noise Annex) and other guidance give guidance on the process and mitigation that should be used to ensure good acoustics design mitigates noise impacts. This PEIR provides forecasts of air noise, ground noise and road traffic noise that will assist in designing for future conditions to ensure adverse effects are minimised and significant effects are avoided.

14.11.16 Proposals for a third runway at Heathrow approximately 37 km from Gatwick would increase aircraft noise over a wide area including in the area between the two airports. Heathrow Airspace and Future Operations consultation material shows that airspace design envelopes could bring aircraft south towards Gatwick below 7,000 ft so there is potential for additional overflights in the areas overflown by aircraft using Gatwick with the Project. The design of the airspace required to facilitate a third runway at Heathrow is not developed to a stage that allows cumulative assessment at this stage because noise levels cannot be modelled without defined air traffic routes. It seems unlikely that that LOAEL noise contours from the two projects would overlap, but a cumulative assessment will be undertaken by others to accompany the Airspace Change Proposal that would be required of the Heathrow third runway project if/when this is brought forward. The noise impact assessment for the Northern Runway Project will consider any further information on the Heathrow third runway proposal that comes forward ahead of preparing the ES and consider cumulative noise impacts further, where practicable.

14.11.17 The ATM forecasts used for the noise assessment in this PEIR are for the case without a third runway at Heathrow. The ES will also consider the case with a third runway at Heathrow. The ATM forecasts for Gatwick with a third runway at Heathrow will be used to predict noise levels from the Project. In this scenario, ATMs at Gatwick will be lower than reported in this PEIR and noise impacts will be lower.

14.12. Inter-Related Effects

Introduction

14.12.1 Noise impacts have the potential to affect the assessments carried out under the following related topics:

- landscape and visual impacts;
- historic environment;
- health; and
- economics.

14.12.2 The following sections discuss how each inter-related effect has been considered and assessed. In general, the approach is to assess the significance of the noise effect within the chapter, and then to provide information from the noise modelling results to these other topic areas to inform their assessment of significant effects for these other topics.

Landscape and Visual Effects

14.12.3 The assessment of landscape and visual impacts has drawn on the assessment of overflights reported in this chapter, using two sets of results. Firstly, the mapping of overflights from the northern runway close to the airport, as reported in Section 14.9 (see Figure 14.9.28), has been used to assess visual impacts in those areas.

14.12.4 Secondly, the assessment of landscape and visual impacts has used the overflight analysis covering the wider area 35 miles around Gatwick Airport, as reported in Section 14.9 and illustrated in Figures 14.6.7, 14.6.8, 14.6.9, and 14.9.29. In addition, the change in the numbers of overflights expected at eight locations that are representative of important landscapes have been assessed individually. These eight locations were chosen by the landscape and visual

assessment team to represent the more sensitive landscapes in the areas and are shown on each of the overflight figures.

14.12.5 The assessment of the Project in 2032 is approximated by considering the change in the total number of overflights at these locations that would arise if 20% more Gatwick fights were added to the actual number of overflights in 2018. Appendix 14.9.2 gives details of the methodology. In practice, non-Gatwick overflights would also increase slightly from 2018 to 2029, so the proportional increase of the additional Gatwick flights would be slightly diluted, ie this is a worst case approximation. The results are summarised in Table 14.12.1.

Table 14.12.1: Daily Overflights at Landscape Assessment Locations

Landscape Assessment Location	Non-Gatwick Daily Overflights	Gatwick Daily Overflights	Non-Gatwick and Gatwick Daily Overflights	Non-Gatwick Overflights and Gatwick +20% Overflights	Increase in Overflights with Gatwick +20%	% Increase with Gatwick +20%
Witley and Milford Commons	17.2	1.3	18.6	18.8	0.3	1
Hever Castle	9.0	246	254.6	303.8	49.2	19
Wakehurst Place	1.1	11.5	12.6	14.9	2.3	18
Leith Hill	0.8	3.3	4.1	4.8	0.7	16
Petworth House	10.6	1.6	12.2	12.5	0.3	3
Temple of the Winds, Blackdown	15.9	4.2	20.2	21.0	0.8	4
Ditchling Beacon	8.9	3.7	12.6	13.4	0.7	6
Firle Beacon	6.4	10.0	16.4	18.4	2.0	12
Ashdown Forest	2.7	84.9	87.6	104.5	17.0	19

14.12.6 For example, at Hever Castle, there were 246 Gatwick overflights each 24 hour day on average within the 92 day summer period. There were nine overflights from other airports, giving 255 in total. If there were 20% more Gatwick flights this total would rise by 19% to 304. This is because Hever is directly aligned with the easterly arrivals runway centreline so is overflown by most arrivals from the east, and is also overflown by departures to the East.

14.12.7 Temple of the Winds, Blackdown is located to the west under a Gatwick departure route but some 35 km from the airport by which time Gatwick fights are partly dispersed. It is also overflown by some arrivals from the west, but again few in number due to the distance from the airport. On an average summer day it had four overflights from Gatwick flights. It was overflown by aircraft from other airports including Heathrow, on average 16 times a day, giving a total of 20 overflights per day. The effect of increasing Gatwick flights by 20% here would increase this daily total overflights from 20 to 21, ie by only 4%. Witley and Milford Commons, Petworth House, and Ditchling Beacon would see similarly small changes as a result of the Project.

14.12.8 The changes in tranquillity and overall effects on the designated areas that the eight locations represented are discussed in Chapter 8: Landscape, Townscape and Visual Resources.

Historic Environment

14.12.9 The assessment of impacts on historic environment resources has considered the noise changes reported in this chapter where relevant, as reported in Chapter 7: Historic Environment.

14.12.10 For air noise, consultation with Historic England confirmed that changes in noise levels should be used to scope the assets that could potentially affected by noise. Noise modelling was carried out and two heritage assets were identified as potentially affected by noise increases of more than $L_{eq\ 16\ hour}$ 1 dB as follows:

- Lowfield Heath Windmill, RH6 0EQ +2.0 dB
- Thunderfield Castle, RH6 9PP +1.2 dB

14.12.11 Noise modelling results were provided to the historic environment assessment team, the details of which are given in Appendix 14.9.2.

Health and Economic Appraisal

14.12.12 Transport Appraisal Guidance (WebTAG) offers a method to appraise the following quantifiable health effect of noise and to assign a cost to each based on a 60 year net present value (NPV):

- sleep disturbance;
- annoyance (amenity);
- acute myocardial infarction (AMI) heart attacks;
- strokes; and
- dementia.

14.12.13 For the air noise assessment, the CAA noise modelling team carried a WebTAG assessment for air noise using the 2029, 2032, 2038 and 2047 noise modelling results for the Project. Details are provided in Appendix 14.9.2. The results are summarised in Table 14.12.2 (negative values are costs due to noise increase).

Table 14.12.2: Summary of NPV (Net Present Value) Information Relevant to this Chapter

Health Effect	NPV in 2010 Prices (£)
Sleep Disturbance	-£3,482,621
Amenity	-£5,133,847
Acute Myocardial Infarction	-£48,372
Strokes	-£826,173
Dementia	-£1,246,250
Total	-£10,737,264

14.12.14 A number of assumptions are made in order to complete the workbook. There is an assumption that for the 47 years beyond 2038 noise levels are assumed constant in order to arrive at a 60 year discounted appraisal result. This is unlikely and more so for night noise given the night noise restrictions which are expected to prevail and reduce night noise levels.

14.12.15 The sleep disturbance costs are less than half the total. This is shown in the night-time noise contours changing less with the Project than day contours.

14.12.16 These results are used in the economic appraisal reported in Chapter 16: Socio-economics.

14.12.17 Similar WebTAG appraisals will be prepared for ground noise and road traffic noise in the ES. The results for these are likely to be smaller than for air noise.

14.13. Summary

Overview

14.13.1 The noise and vibration assessment considers the following sources and their potential impact on NSRs:

- construction noise and vibration – noise and vibration from temporary construction of the Project, including the use of construction compounds;
- air noise – noise from aircraft in the air or departing or arriving (including reverse thrust) on a runway;
- ground noise – noise generated from airport activities at ground level including aircraft taxiing and traffic within the airport boundary; and
- road traffic noise – noise from road traffic vehicles outside the airport on the public highway.

14.13.2 All four types of noise have been modelled based on forecasts of plant, road and airport traffic expected in the various assessment years. The noise changes are compared to the do-minimum in the relevant year, and also to the baseline conditions in 2019. The noise assessment results are summarised in this chapter, with five supporting appendices and illustrated by 67 figures.

Approach

14.13.3 The EIA Regulations require the identification of likely significant effects and mitigation to avoid or reduce significant effects. This PEIR chapter presents the preliminary findings of the assessment. As such the conclusions presented here are preliminary and may be revised by more detailed work throughout the EIA process and reported in the ES following consultation. Consequently, the assessment method may also develop further from that used in the PEIR. For example, consultation may reveal noise or vibration sensitive receptors with particular sensitivities requiring specific attention.

14.13.4 As described in Section 14.2, the Airports NPS states that '*Development consent should not be granted unless the Secretary of State is satisfied that the proposals will meet the following aims for the effective management and control of noise, within the context of Government policy on sustainable development:*

- *Avoid significant adverse impacts on health and quality of life from noise;*
- *Mitigate and minimise adverse impacts on health and quality of life from noise; and*
- *Where possible, contribute to improvements to health and quality of life*.'

14.13.5 The approach to assessing noise effects from the Project therefore firstly identifies significant adverse effects on health and quality of life that may arise where noise at a receptor newly exceeds the SOAEL, and it identifies mitigation measures to avoid these. Secondly, the assessment identifies adverse effects that may arise above LOAEL but below SOAEL and

identifies mitigation measures to minimise these as far as practicable. Thirdly, opportunities to reduce noise levels from the base case so as to improve health and quality of life have been explored.

Construction Noise and Vibration

14.13.6 Construction noise has been assessed based on the preliminary design of the works, making a series of worst case approximations where necessary. Noise levels have been predicted for 13 phases of construction for the 12 individual years between 2024 and 2035 and the period 2036 to 2038. Much of the work on the airfield would be required to be undertaken at night. This has potential to impact various communities outside the airport the perimeter, around Charlwood village, in the area immediately south of the airport (Lowfield Heath) and on the south side of Horley where night works are likely to be required to build the highway works at the North and South Terminal roundabouts and at the Longbridge Roundabout. Overall the assessment results indicate that there is potential for adverse noise effects at approximately 150 properties during the day and approximately 500 during the night. The potential for impacts arising from construction traffic will be assessed in the ES.

14.13.7 A variety of mitigation measures are proposed to reduce the potential noise impacts, including reducing noise at source through quieter methods of working, screening, limiting hours of work and, as a last resort, noise insulation. A noise insulation scheme for construction noise would be developed to mitigate any predicted impacts above the SOAEL so as to avoid significant effects of health and quality of life. The initial predictions suggest that night time impacts may be sufficient to require this type of mitigation; this will be reviewed based on refined project information and mitigation in the ES. The Project would also adopt the Section 61 process whereby plans for noisy works must be done using the BPM to minimise impacts and submitted to the local authority for prior approval before work can begin. An outline CoCP has been developed, to deliver these mitigation measures through the construction contract, and will be refined as the EIA process continues to ensure that all adverse noise effects are mitigated as far as practicable.

14.13.8 Vibration is unlikely to give rise to significant effects, but will be assessed and reported in the ES.

Air Noise

14.13.9 Air noise has the potential to affect residents, and other NSRs over a wide area beyond the airport boundary. The assessment has included modelling changes in noise that can be expected over this area. It uses a number of noise metrics to quantify the changes in noise that are expected following established guidance, and also provides additional detail on the changes that are expected at representative communities and noise sensitive community buildings. Air noise modelling carried out by the CAA's Environmental Research and Consultancy Department (ERCD) indicates that noise impacts would be greatest in the 2032 interim assessment year. After this, the effect of the aircraft fleet shifting to quieter types outweighs the effect in increasing ATMs.

14.13.10 The air noise assessment has considered the range of noise levels likely in each future assessment year that would result from the range of aircraft fleet that could operate. As aircraft age, airlines replace them with next generation aircraft so that over time the fleet transitions to next generation aircraft and, other things being equal, overall noise levels reduce. The ATM forecasts used for the modelling of noise in the future are based on estimates of how the fleet will

transition based on assumptions around airlines' fleet procurement programmes and business models. The 'central case' used in the noise assessment is based on what is considered today to be the most likely rate of fleet transition. However, there is uncertainty around this, particularly at the current time due to the global pandemic and the financial impact on the airlines. Therefore air noise modelling has also been carried out for a 'slower transition fleet' case, based on ATM forecasts in which the rate of fleet transition is delayed by about five years and which would result in higher noise levels than the central case.

14.13.11 The existing northern runway is currently only used when the main runway is unavailable; for example, due to maintenance work at night. In 2018, the northern runway was used by 3,543 flights, and in 2019 it was used for 2,842 flights. The Project would make alterations to the existing northern runway, resulting in increased use of this runway using the same flight paths. The smaller ICAO 'Code C' aircraft (ie <36 metre wingspan (not larger types, eg B787 and A350)) would use the northern runway. Consequently, any noise impacts of the Project would be the result of increases in noise due to the increased number of flights on the northern runway, rather than new noise impacts over areas previously unaffected. This would therefore avoid the noise impacts often associated with new flight paths.

14.13.12 In 2032, the population within the SOAEL $L_{eq,\ 16\ hour}$ day 63 dB contour is predicted to rise from approximately 400 to 500 (the ranges provided cover the range of noise levels arising from the central case and slower transition fleet cases) in the base case to approximately 500 to 600 with the Project. The Project is expected to result in significant adverse effects on health and quality of life in the daytime for about 160 people in the slower transition case, and mitigation is proposed through the Inner Zone NIS to avoid these effects.

14.13.13 In 2032, the population within the daytime LOAEL $L_{eq,\ 16\ hour}$ day 51 dB contour is predicted to rise from 16,100 to 23,500 in the base case to 18,800 to 26,400 with the Project and remain below the 24,050 in 2019 except in the slower transition fleet case. Thus the Project is predicted to increase the population within the LOAEL $L_{eq,\ 16\ hour}$ day 51 dB contour by 2,700 to 2,900 people in 2032. However, for the majority (61 to 68% for daytime and 97 to 99% for night-time) of those affected the noise changes would be less than 1 dB and negligible. Approximately 1,800 to 4,900 people living to the south of the airport would see noise levels reduce, with 1,200 to 4,300 of these being negligible (<1 dB) and about 600 low (1-3 dB).

14.13.14 To the north and in the Smallfields area to the north east, approximately 4,800 to 6,500 people are predicted to experience 1 to 2 dB increases in daytime noise, which is likely to result in minor adverse and not significant effects. The majority of the residential properties in this area would be eligible for the new Outer Zone NIS, which would further reduce noise effects in this area.

14.13.15 To the west, approximately 300 to 400 people are expected to experience noise increases of 2-3 dB, which are likely to be minor adverse and not significant effects. All the residential properties in this area would be eligible for the new Outer Zone NIS, which would further reduce noise effects in this area.

14.13.16 To the west of the western end of the northern runway approximately 40 properties on Ifield Road and near Russ Hill have been identified as experiencing increases of 3-6 dB which are potentially moderate significant effects. These houses would be eligible for full noise insulation under the new Inner Zone NIS, to mitigate the potentially significant effects.

14.13.17 Noise changes at night would be lower than during the day because it is assumed that the current night restrictions would continue to cap aircraft numbers in the 23:30-06:00 hours period. In 2032, the population within the SOAEL $L_{eq,\ 8\ hour}$ night 55 dB contour is predicted to rise from approximately 900 to 1,100 in the base case, by approximately 160 with the Project. As a result the Project is expected to result in moderate significant adverse effects on health and quality of life in the night-time for about 160 people, and mitigation is proposed through the Inner Zone NIS to avoid these effects. The areas within the day and night SOAEL contours overlap so that the total number of people within the day or night SOAEL contours due to noise increases from the Project in 2032 is approximately 200 people, all of which are within the Inner Zone NIS.

14.13.18 50 noise sensitive community buildings within the $L_{eq,\ 16\ hour}$ day 51 dB noise contour in 2032 with the Project have been assessed. These comprise 21 schools, one hospital, 18 places of worship and seven community buildings. At two places of worship in Crawley noise levels are expected to reduce by 1-2 dB. At 42 of these buildings noise levels are predicted to either decrease or increase by less than 1 dB, ie a negligible increase, as a result of the Project compared to the 2032 baseline, with low increases of 1-2 dB at the others. A noise insulation scheme would be developed for any school adversely affected.

14.13.19 The assessment of significant effects is based primarily on the predicted levels and changes in the primary noise metrics, $L_{eq,\ 16\ hour}$ day and $L_{eq,\ 8\ hour}$ night, but additional noise metrics are used to provide more detail on the changes that would arise. Number Above metrics N65 and N60 night show how the numbers of aircraft above L_{max} 65 dB and L_{max} 60 dB are expected to change. Seven Community Representative Locations have been used to illustrate the effects on the most populated areas affected by aircraft noise. The European metrics L_{den} and L_{night} have also been used to report air noise changes as annual averages for day evening and night and also separately for night.

14.13.20 Beyond the noise contours, the extent to which the number of overflights below 7,000 feet would change have been computed to give stakeholders further from the airport information on how many more aircraft would overfly them as a result of the Project.

14.13.21 A noise envelope is proposed to set limits on noise from future operations at the airport in terms of the areas of $L_{eq,\ 16\ hour}$ day and $L_{eq,\ 8\ hour}$ night noise contour areas. Noise limits are proposed for two periods, first for the period from when the northern runway opens up to when the noise impacts are expected to be greatest about three years later, and second for when the airport grows to operate at 382,000 commercial ATMs and thereafter. The latter noise contour areas are smaller. The area of the L_{eq} day and night contours would not exceed these limits, and the noise envelope would provide certainty to the community that noise levels would be limited and would reduce in the future so as to share the benefits of new technologies with the community. Appendix 14.9.5 provides details of the noise envelope, the options considered and its possible implications for consultees to consider.

Ground Noise

14.13.22 Ground noise from aircraft taxiing and within the airfield has been modelled using a model calibrated with measurements made on the airfield in spring 2019 and baseline measurements made at 12 representative receptors. The increase in numbers of aircraft and the addition of taxiways closer to neighbouring properties to the north has the potential to lead to noise increases, and mitigation has been incorporated including: bunding 8 metres in height situated at the western end of northern runway, and noise barriers 10 metres high adjoining the bund

installed at the western end of the northern runway and running for approximately 500 metres just to the north of the relocated Juliet Taxiway.

14.13.23 The results show predicted ground noise impacts are not significant (negligible or minor) at the majority of the represented receptors studied with moderate adverse effects at three of the 12 receptor areas. The effects rated as moderate are considered significant and these are predicted in the Charlwood and Povey Cross areas and the area immediately south of the airport, at a total of approximately 90 properties. These are conservative estimates that will be further refined in the ES.

14.13.24 The majority of the NSRs around the airport perimeter that may be adversely impacted by ground noise are within the areas covered by the current or proposed NIS, as shown in Figure 14.8.1. The 10 properties where SOAEL may be exceeded are within or close to the Inner Zone NIS boundary. The Inner Zone NIS will be modified, if necessary, when the ES assessment is completed, so that significant effects on heath and quality of life are avoided.

Road Traffic Noise

14.13.25 The remodelling of the Longbridge, North Terminal and South Terminal roundabouts and associated highways works have potential to increase noise levels in the adjacent Riverside Garden Park and residential area. A detailed noise model has been used to predict noise levels and to compare them to the do-minimum in 2032 and 2047 as required by the DMRB methodology. Noise barriers have been incorporated in the elevated sections of new highway. These would ensure that at most receptors, including within the park, noise levels would reduce as a result of the Project. Further modelling of traffic forecasts will be undertaken and reported in the ES, the numbers of properties affected by the different noise changes will be assessed, and is likely to conclude that the benefits are of negligible or minor significance in most areas with some moderate significant benefits in small areas where the highest baseline noise levels would be reduced.

14.13.26 Noise levels on other roads not part of the highway works could be changed by traffic changes resulting from the Project. Initial modelling indicates these noise changes would be insignificant, and further modelling will be carried out and reported in the ES.

Next Steps

14.13.27 Further meetings will be held with the Local Authorities Noise Working Topic Group to discuss methodologies and particular sensitivities and receptors.

14.13.28 Further work will be undertaken to identify particular non-residential receptors that may be affected, and an assessment of effects at relevant properties will be included in the ES.

14.13.29 The noise modelling carried out in respect of construction noise will be reviewed in light of any potential changes to the proposed construction methods between the submission of the PEIR and the ES, and further mitigation will be developed to minimise adverse effects.

14.13.30 The air noise assessment will be extended to also consider air traffic forecasts for the Project in the future with a third runway at Heathrow, where sufficient information is available at the time. A final noise envelope will be proposed taking account of stakeholders views.

14.13.31 The assessment carried out in respect of ground noise will be updated, if necessary, in light of future refinements and additional ground noise modelling.

14.13.32 Further road traffic noise modelling will be carried out to quantify temporary noise impacts from construction traffic during the day and night, and for the operational traffic flows during the night up to 15 years after opening.

Table 14.13.1: Summary of Effects

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
Initial construction phase (2024-2029)							
Properties adjacent to the works	Residential (high) and non-residential (various) NSRs	Construction noise during daytime, evening and night-time	Short term	Medium. For whole construction period potential for adverse effects at approximately 150 properties during the day and approximately 500 during the night without mitigation	Moderate after mitigation, subject to further assessment	Subject to further assessment	Mitigation through CoCP
Properties adjacent to construction traffic routes	Residential (high) and non-residential (various) NSRs	Construction traffic noise during daytime, evening and night-time	Short term	To be assessed in ES	To be assessed in ES	To be assessed in ES	

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
First full year of operation (2029)							
Properties above LOAEL construction noise	The construction noise impacts in 2029 and beyond are included in the estimates for 2024 to 2029 above.						
Properties within LOAEL air noise contours	The air noise impacts in 2029 would be lower than those for 2032 reported below						
Properties within LOAEL ground noise contours	The ground noise impacts in 2029 would be lower than those for 2032 reported below						
Interim assessment year (2032)							
Properties south of airport	Residential (high) and non-residential (various) NSRs	Air noise disturbance	Permanent	Day 1,700 to 4,800 people: negligible to medium Night 100- 200 people: negligible	Minor beneficial (day) Negligible (night)	Not significant	

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
Population above LOAEL		Air noise disturbance	Permanent	Day 13,000 to 16,000 people: negligible. Night 21,000 to 28,000 people: negligible.	Negligible	Not significant	
North of airport and Smallfields, and west (day) West of runway (night)		Air noise disturbance	Permanent	Day 5,200 to 7,000 people: low. Night 300 to 500 people: low.	Minor adverse	Not significant	Homes within the $L_{eq\ 16\ hour}$ 54 dB contour will be eligible for the Outer Zone NIS
West of runway Ifield Road, Russ Hill		Air noise disturbance	Permanent	Day 40 homes: medium to high. Night 60 homes: medium to high. Approximately 80 homes above SOAEL due to Project.	Moderate adverse	Significant	All homes eligible for Inner Zone NIS to avoid significant effects
Community receptors	21 schools, one hospital, 18 places of worship and seven	Air noise disturbance	Permanent	Negligible/low	Negligible or minor	Not significant	A noise insulation scheme will be developed for any school adversely affected

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
	community buildings						
Properties within LOAEL ground noise	Residential (high) and non-residential (various) NSRs	Ground noise disturbance	Permanent	Negligible or low	Negligible or Minor	Not Significant	
Properties in Charlwood and Povey Cross areas and the area immediately south of the airport		Ground noise disturbance	Permanent	Approximately 90 properties (conservative estimate to be refined)	Moderate adverse, subject to further study	Significant	Noise bund and barrier minimises impacts to below SOAEL.
Area immediately south of the airport	Residential (high)	Ground noise disturbance	Permanent	Approximately 10 properties	Moderate adverse, subject to further study	Significant	The Inner Zone NIS will be offered to mitigate significant effects (above SOAEL) predicted at approximately 10 properties in the Myrtle Cottage area.
Community receptors	Non-residential properties	Ground noise disturbance	Permanent	Bear and Bunny Nursery – Moderate.	Minor. Others to be assessed	Not significant	

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
				Impacts at other properties to be assessed in ES			
Properties within LOAEL road traffic noise contours	Residential (high) and non-residential (various) NSRs	Road traffic noise disturbance from roads modified by the Project	Permanent	Negligible to low/medium beneficial.	Not significant/ significant	Not significant to significant beneficial	Includes noise barriers
Properties within 50 m of non-Project road links	Residential (high) and non-residential (various) NSRs	Road traffic noise disturbance on unchanged roads	Permanent	Negligible to low noise changes	Not significant	Not Significant	
Design year (2038)							
Properties within LOAEL air noise contours	The air noise impacts in 2038 would be lower than those for 2032 reported above						
Properties within LOAEL	The ground noise impacts in 2038 would be lower than those for 2032 reported above						

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
ground noise contours							
Properties within LOAEL road traffic noise contours	Road traffic noise has been assessed 15 years after opening, in 2047. in accordance with the DMRB, see below.						
Year (2047)							
Properties within LOAEL road traffic noise contours	Residential (high) and non-residential (various) NSRs	Road traffic noise disturbance from roads modified by the Project	Permanent	Negligible	Not significant	Not significant	Includes noise barriers
Properties within 50 m of non-Project road links	Residential (high) and non-residential (various) NSRs	Road traffic noise disturbance on unchanged roads	Permanent	Negligible noise reductions	Not significant	Not Significant	

14.14. References

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14.15. Glossary

Table 14.15.1: Glossary of Terms

Term	Description
AONB	Area of Outstanding Natural Beauty
APF	Aviation Policy Framework
APU	Auxiliary Power Unit
ATM	Air Traffic Movement
A-Weighting	Environmental noise measurements and levels are usually expressed using a variation of the decibel scale, which gives less weight to low frequencies and very high frequencies. This system was derived to correspond to the reduced sensitivity of the human hearing mechanism to these frequencies.
Background Noise	Background noise is the noise without the proposed changes in the use of the airport. The L_{Aeq} is used in the ground noise study parameter to indicate the ambient noise conditions that exist in the background noise.
BAU	Business as Usual
BNL	Basic Noise Level
BPM	Best Practicable Means
CAA	Civil Aviation Authority
CEA	Cumulative Effects Assessment
CoCP	Code of Construction Practice
CRTN	Calculation of Road Traffic Noise
DfT	Department for Transport
DMRB	Design Manual for Roads and Bridges
EAT	End around taxiway
EGR	Engine Ground Running
EIA	Environmental Impact Assessment
ERCD	Environmental Research and Consultancy Department
FPT	Flight Performance Team
GATCOM	Gatwick Airport Consultative Committee
GPU	Ground Power Unit
ES	Environmental Statement
ICAO	International Civil Aviation Organization
ICCAN	Independent Commission on Civil Aviation Noise
$L_{Aeq, T}$ - Equivalent Continuous Sound Level	The L_{Aeq} level gives a single figure to describe a sound that varies over a given time period, T. It is the A-weighted steady sound level that would result in the same sound energy at the receiver as occurred in practice with the varying level. It is derived from the logarithmic summation of the sound signal and so unlike a conventional (linear) average it gives additional weighting to higher levels.
$L_{Aeq, 16 hours}$	The L_{Aeq} over the daytime and evening period 07:00 to 23:00 hours, for aircraft noise for an average summer day between 16 June and 15 September. In this report all noise levels are A-weighted and in places the A is omitted for simplicity written $L_{eq, 16 hour}$

Term	Description
$L_{Aeq, 8\ hours}$	The L_{Aeq} over the night period 23:00 to 07:00 hours, for aircraft noise for an average summer night between 16 June and 15 September. In this report all noise levels are A-weighted and in places the A is omitted for simplicity written $L_{eq, 8\ hour}$
L_{max}	The L_{max} s is the highest value of the sound level over the specified period. It is sometimes referred to as 'peak' noise level. However, the term 'peak' has a special meaning in acoustics and the expression 'maximum' is preferable to avoid confusion. The 's' stands for slow response, which is the metric usually used for aircraft noise. In this report all L_{max} levels are A-weighted.
LOAEL	Low Observed Adverse Effect Level
N60 night	Numbers of aircraft during an average summer night above L_{max} 60 dB
N65 day	Numbers of aircraft during an average summer day above L_{max} 65 dB
NaTMAG	Noise and Track Monitoring Advisory Group
NIS	Noise Insulation Scheme
NOEL	No Observed Effect Level
NPPF	National Planning Policy Framework
NPRs	Noise Preferential Routes
NPS	National Policy Statement
NPSE	Noise Policy Statement for England
NPV	Net Present Value
NSR	Noise Sensitive Receptor
NTK	Noise and Track Keeping
Overflight	An aircraft overflying a receptor on the ground at a height of less than 7,000 ft above the ground and at an angle of at least 48.5 degrees from the horizontal, as defined by CAP1498.
PEIR	Preliminary Environmental Information Report
Quiet Areas	Designated under Local Plans or Neighbourhood Development Plans as Local Green Spaces and areas identified as Quiet Areas through implementation of the Environmental Noise (England) Regulations 2006
QC	Quota Count
SID	Standard Instrument Departure
SOAEL	Significant Observed Adverse Effect Level
SONA	Survey of Noise Attitudes
Standard Mode	Year on year the proportion of aircraft taking off to the east and to the west varies according to wind conditions. Standard mode contours take the 20 rolling average runway modal split; in 2018 this was 75% west/25 % east for the L_{eq} period. At night a 10 year average is used, and in 2018 this was 76% west/24% east.
TRL	Transport Research Laboratory
WHO	World Health Organization
WebTAG	Web based Transport Appraisal Guidance: https://www.gov.uk/guidance/transport-analysis-guidance-webtag\
ZoI	Zone of Influence

Preliminary Environmental Information Report
Chapter 15: Climate Change and Carbon

September 2021

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15 Climate Change and Carbon

15.1. Introduction

15.1.1 This chapter of the Preliminary Environmental Information Report (PEIR) presents the findings of the Environmental Impact Assessment (EIA) work undertaken to date concerning the potential effects of the proposal to make best use of Gatwick's existing runways (referred to within this report as 'the Project') on climate change and carbon.

15.1.2 This chapter presents the assessment of the following.

- **Climate Change Resilience (CCR):** the resilience of the design, construction and operation of the Project to projected future climate change impacts.
- **In-combination Climate Change Impacts (ICCI):** the combined effects of the Project and potential climate change impacts on the receiving environment and community.
- **Greenhouse Gas Emissions[1] (GHG):** the likely effect of the Project on GHG emissions. Throughout this document the term 'carbon' has been used as shorthand to refer to greenhouse gases[2]. An exception to this general reporting approach relates to aviation emissions where carbon dioxide (CO_2) emissions alone are reported (excluding other GHGs). The chapter considers GHG emissions from two groupings of activities:
  - Construction-related emissions arising from the extraction, processing and manufacture of construction materials; transportation of these materials; the energy and water used during construction processes; transport and disposal of waste; and transport of construction workers.
  - Operational emissions comprising emissions from aircraft on the ground, in the Landing and Take-off (LTO) cycle and Climb-Cruise-Descent (CCD) stage; surface access (transport) of passengers, staff and freight; and the operation of airport buildings, assets and vehicles including energy use (heating/cooling/power), provision of potable water, treatment of waste water, waste treatment, fuel consumption in vehicles and mobile plant, Auxiliary Power Units (APU), Ground Power Units (GPU), Fixed Electrical Ground Power (FEGP), Ground Support Equipment (GSE), firefighting activities and aircraft engine testing.

15.1.3 In particular, this PEIR chapter:

- sets out the existing and future environmental baseline conditions, established from desk studies and consultation to date;

[1] Greenhouse gases are defined as those gases within the 'Kyoto basket' ie carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride (SF_6). Other non-Kyoto emissions are considered likely to contribute to climate change (both through warming and cooling effects) including through radiative forcing mechanisms. Further detail on these emissions, and the level of understanding around their effects and impacts, can be found in the Committee on Climate Change (CCC) 2009 Report "Meeting the UK aviation target - options for reducing emissions to 2050 (CCC, 2009) and in the CCC's Sixth Carbon Budget report (CCC, 2020). The recent Jet Zero consultation from UK Government explicitly references Non-CO2 impacts and notes that the impact of these emissions has a large degree of uncertainty. The consultation notes that the UK Government is seeking to improve understanding of these impacts and will use most recent available information in the formation of policy. This is further discussed in section 15.4.7 below..

[2] GHGs are quantified by mass. To provide a single metric GHGs other than CO_2 are converted into 'CO_2 equivalent' (CO_2e) which (where applicable) have been added to the emissions of CO_2 to provide a single quantification.

- presents the potential environmental effects on climate change and carbon arising from the Project, based on the information gathered and the analysis and assessments undertaken to date;
- identifies any assumptions and limitations encountered in compiling the environmental information; and
- highlights any necessary mitigation measures that could prevent, minimise, reduce or offset the possible environmental effects identified in the EIA process, and describes any monitoring required during construction or operation.

15.1.4 This chapter is accompanied by Appendices 15.2.1: Summary of Local Planning Policy, 15.3.1 Summary of Stakeholder Consultation, 15.4.1: Climate Change and Carbon Technical Appendix, 15.4.2: CCR Assessment Definitions, Appendix 15.9.1 CCR Assessment, Appendix 15.9.2 ICCI Assessment and Figures 15.6.1 and 15.6.2.

15.1.5 A technical appendix setting out the Draft Energy Strategy which has informed the GHG assessment is presented in Appendix 5.4.1 of the PEIR.

15.1.6 The PEIR will inform pre-application consultation. Following consultation, comments on the PEIR will be reviewed and taken into account in preparation of the Environmental Statement (ES) that will accompany the application to the Planning Inspectorate for development consent for the Project. The application will also incorporate the draft Carbon and Climate Change Action Plan (see section 15.8 on Mitigation) specifying the actions to be taken by Gatwick to reduce climate impacts from the construction and operation of the airport, and to fulfil its role in supporting decarbonisation of the wider aviation sector.

15.2. Legislation and Policy

Legislation

15.2.1 The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 requires a description of the factors likely to be significantly affected by the development including climate (for example greenhouse gas emissions and impacts relevant to adaptation) (Schedule 4 (Para 4(4))) and a description of the likely significant effects of the development on the environment resulting from "*the impact of the project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change"* (Schedule 4 (para 5(f)).

15.2.2 The Climate Change Act 2008 (Section 56) (amended 2019) commits the Secretary of State (Department for Business, Energy and Industrial Strategy (BEIS)) to *"lay reports before Parliament containing an assessment of the risks for the United Kingdom of the current and predicted impact of climate change"'*.

15.2.3 This includes a mechanism under which certain organisations report on their preparedness in relation to climate change. The Secretary of State directed a number of infrastructure owners and operators, including Gatwick, to input to the first round of reporting. The second round of reporting was, and the third round will be, voluntary. The UK Climate Change Act 2008 required Gatwick to report on how the airport is addressing current and future climate impacts. Gatwick has developed Climate Change Adaptation Reports (CCAR) for the first and second rounds of reporting. The third round of reporting is underway and will be published in 2021. These existing adaptation reporting processes are relevant to this PEIR assessment as all climate change risk

assessment and associated environmental measures identified through this assessment will feed into Gatwick's reporting thereafter.

15.2.4 The CCAR must be prepared at no longer than five yearly intervals. To date two CCARs have been produced (Department for Environment, Food and Rural Affairs (Defra), 2012 and 2017). Paragraph 4.49 of the Airports National Policy Statement (NPS) (Department for Transport, 2018a) requires that adaptation measures proposed in relation to new airport infrastructure are based on the most recent CCAR (Defra, 2017).

15.2.5 Section 58 (1) of the Climate Change Act 2008 notes: *'It is the duty of the Secretary of State to lay programmes before Parliament setting out — (a) the objectives of Her Majesty's Government in the United Kingdom in relation to adaptation to climate change, (b) the Government's proposals and policies for meeting those objectives, and (c) the time-scales for introducing those proposals and policies, addressing the risks identified in the most recent report under section 56.'* The National Adaption Programme (NAP) is prepared by the SoS in response to this obligation.

15.2.6 The NAP must contribute to sustainable development and should be presented as soon as possible after the climate change risk assessment reporting under Section 56 has been completed (s58(2) and (3)).

15.2.7 The amended Section 1 of the Climate Change Act 2008 sets a GHG emissions reduction target for the UK of 100 per cent by 2050, compared to a 1990 baseline (the 'Net Zero' target). This revised target was introduced in 2019 as a change from the previous 80 per cent reduction target. The Committee on Climate Change (CCC) establishes five-year national carbon budgets to achieve this target.

15.2.8 The establishment of carbon budgets respond to the Paris Agreement which provides for the international community to keep the increase in global average temperatures to well below 2°C above pre-industrial levels, and to pursue efforts to limit the temperature increase to 1.5°C. The UK's Nationally Determined Contribution (NDC) to the United Nations Framework Convention on Climate Change (UNFCCC) in line with Article 4 of the Paris Agreement commits the UK to reducing economy-wide greenhouse gas emissions by at least 68% by 2030, compared to 1990 levels.

15.2.9 The most recent UK carbon budget recommendation was the Sixth Carbon Budget (CCC, 2020) covering the period 2033-37 which was the first to fully reflect the revised Net Zero target for 2050. The Sixth Carbon Budget was adopted by the UK Government in 2021. Following recommendations by the CCC the Sixth Carbon Budget formally includes emissions from international aviation within the target of 965 $MtCO_2e$, a 78% reduction on 1990 levels . Prior to this UK carbon budgets included only domestic aviation emissions and left 'headroom' within the budget for international aviation (and shipping) emissions.

15.2.10 The adoption of a net zero target in the UK under the Climate Change Act has recently been reflected for the transport and aviation sectors in the publication of the Transport Decarbonisation Plan (DfT, 2021a) and the accompanying Jet Zero consultation (DfT, 2021b) which sets out the proposal to introduce a trajectory to Net Zero for the aviation sector in the UK. This is proposed to incorporate a range of measures to reduce sectoral emissions, and for offsetting and GHG removals to reduce residual emissions to Net Zero.

15.2.11 The Greenhouse Gas Emissions Trading Scheme Order (2020) provides the legislation which implements the UK Emission Trading Scheme (UK ETS). This is a cap-and-trade mechanism which includes aviation emissions. It replaced, for the UK, the role of the EU ETS following the UK's exit from the European Union. The UK has consulted on how the UK ETS will integrate with wider industry initiatives to reduce GHG emissions (DfT, 2021c) – specifically the ICAO's Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) which is a global market-based measure whereby offsetting is used to reduce sectoral emissions to agreed levels.

Planning Policy Context

National Policy Statements

15.2.12 The Airports NPS (Department for Transport, 2018a), although primarily provided in relation to a new runway at Heathrow Airport, remains a relevant consideration for other applications for airport infrastructure in London and the south east of England.

15.2.13 The NPS for National Networks (Department for Transport, 2015) sets out the need for development of road, rail and strategic rail freight interchange projects on the national networks and the policy against which decisions on major road and rail projects will be made[3]. This has been taken into account in relation to the highway improvements proposed as part of the Project.

15.2.14 Table 15.2.1 provides a summary of the relevant requirements of these NPSs and how these are addressed within the PEIR.

Table 15.2.1: Summary of NPS Information Relevant to this Chapter

Summary of NPS Requirement	How and Where Considered in the PEIR
Airports NPS	
Paragraphs 4.46-4.52 of the NPS are of relevance to the CCR and ICCI and are summarised below:	
1. The range of impacts of climate change must be considered using the latest UK climate projections and appropriate mitigation or adaption measures identified.	1. The assessment identifies climate change impacts using UK Climate Projections (UKCP18) (the latest set of UK climate change projections) (Met Office, 2018a), as described in Section 15.6 of this chapter. Section 15.8 sets out how embedded environmental measures would be implemented in relation to climate change.
2. To assess the impacts of climate change, the applicant should apply the latest UK climate projections considering a scenario that reflects GHG emissions at the 10%, 50% and 90% probability levels.	2. The use of probability levels from the 10th to the 90th percentile, including the 50th percentile, is described in Table 15.6.7, Table 15.6.8, Table 15.6.9 and Table 15.6.10 of this assessment.
3. There should be no critical features of infrastructure design which may be seriously	3. In preparing this PEIR, climate model outputs from the UKCP18 have been used and the assessment has used

[3] It is noted that the Transport Decarbonisation Plan published by the Department for Transport (DfT) on 14 July 2021 announced DfT's intention to review the NPS for National Networks in due course once demand patterns post-pandemic become clearer. It is understood DfT intend to commence the review by the end of 2021 and complete it by Spring 2023. In the interim and whilst the review is undertaken, DfT have confirmed the NNNPS remains relevant government policy and has full force and effect for the purposes of the Planning Act 2008.

Summary of NPS Requirement	How and Where Considered in the PEIR
affected by more radical changes to climate beyond those projected in the latest UK climate projections.	proportionate and appropriate methods considered to be suitable at this time, as described in Section 15.4. More radical changes to the climate have not been considered at this stage but will be assessed through use of the H++ climate change scenarios (Met Office, 2015), which is the only information available at the current time from the Met Office regarding more extreme changes to climate beyond those in the UKCP18 projections. These assessments will take the form of a sensitivity analysis and will be included in the ES. Such models can help consider possible future climate scenarios or outcomes, but no model that attempts to project the future can do so with certainty and actual events may not occur as projected. As part of the ES, the Client will need to confirm its interpretation of 'radical changes to climate' and identify how climate resilient it wants the infrastructure design to be.
4. Adaptation measures should be based on the latest UK climate projections, most recent UK climate change risk assessment, consultation with statutory bodies and any other appropriate data.	4. The consideration of the UK Climate Change Risk Assessment (CCRA) (Defra, 2017) in the methodology is described in Section 15.4 of this chapter. Table 15.3.1 sets out the responses to Planning Inspectorate comments and Table 15.3.2 outlines engagement with key stakeholders. Mitigation measures have been developed to manage risks. These are described in Section 15.8.
5. If any proposed measures give rise to consequential impacts, the Secretary of State will consider the impact in relation to the application as a whole and the principles of the Airports NPS.	5. The consequential impacts of embedded mitigation in other aspects have been assessed in individual topic chapters within this PEIR. Mitigation identified for climate change has been recorded in Section 15.8; any potential consequential effects have been considered in Section 15.9.
6. Adaptation measures can be implemented at the time of construction where necessary.	6. Elements of the design have been developed to account for climate change adaption and will be implemented at the time of construction.
7. The Secretary of State can require the applicant to ensure that adaptation measures be implemented should the need arise, rather than at the outset of the development.	7. Future adaptation measures are being developed as part of the design.
8. Paragraphs 5.69 and 5.70 state the Government's objective for the aviation sector to contribute to reducing global GHG emissions.	8 - 10. Both the scope of the assessment and the methodology are aligned with the NPS requirements.

Summary of NPS Requirement	How and Where Considered in the PEIR
9. Paragraphs 5.71 to 5.73 explain how the CCC leave a headroom in their five-year UK carbon budgets that account for international aviation.	
10. Paragraph 5.74 outlines the activities with potential to increase GHG emissions: air transport; airport buildings and ground operations; surface access; and construction.	
11. Paragraphs 5.76 and 5.77 provide guidance for the EIA process, including the scope and scenarios that should be covered.	11. The GHG assessment provides preliminary evidence of the carbon impact against the Government's carbon obligations and quantifies the GHG effects of the Project without mitigation scenario. The assessment quantifies the impacts including emissions from aviation; surface access due to airport and construction staff; emissions from surface access due to freight and retail operations and construction site traffic; emissions from surface access due to airport passengers and visitors; emissions from airport buildings and ground operations including energy and fuel use. Section 15.9 sets out the GHG emissions for the key reporting years.
12. Paragraphs 5.78 to 5.80 outline potential mitigation measures and state that *"the applicant is expected to take measures to limit the carbon impact of the project".*	12. Section 15.8 sets out the environmental mitigation measures for the Project and quantifies the adequacy of these measures for reducing the impact of the Project on GHG emissions.
13. Paragraphs 5.82 and 5.83 state: *"Any increase in carbon emissions alone is not a reason to refuse development consent, unless the increase in carbon emissions resulting from the project is so significant that it would have a material impact on the ability of Government to meet its carbon reduction targets, including carbon budgets."* *"The Secretary of State's view of the adequacy of the mitigation measures relating to design, construction and operational phases will be a material factor in the decision-making process."*	13. Section 15.9 addresses the significance of the effect on GHG emissions and addresses the NPS requirement to assess whether the Project has a material impact on the UK Government's ability to meet its carbon reduction targets including the CCC's carbon budgets. Section 15.8 sets out the environmental mitigation measures for the Project.
NPS for National Networks	
14. Paragraph 4.37 of the NPS is of relevance to the CCRA and ICCI: '*how the NPS puts Government policy on climate change adaptation into practice, and in particular how applicants and the Secretary of State should*	14. The assessment uses UKCP18 projections (which have superseded the UKCP09 projections) using Representative Concentration Pathway (RCP) 8.5 emissions scenario ('high') across the range of probability

Summary of NPS Requirement	How and Where Considered in the PEIR
take the effects of climate change into account when developing and consenting infrastructure.' The NPS wording is similar to that in the Airports NPS except in paragraph 4.41 which specifies that: *'where transport infrastructure has safety-critical elements and the design life of the asset is 60 years or greater, the applicant should apply the UK Climate Projections 2009 (UKCP09) high emissions scenario (high impact, low likelihood) against the 2080 projections at the 50% probability level*.'	levels from 10th - 90th percentile therefore the assessment includes the 50th percent probability level.
15. Paragraphs 5.16 to 5.19 of the NPS are of relevance to the GHG assessment and are summarised below.	15 - 17. Section 15.9 assesses whether the Project has a material impact on the UK Government's ability to meet its carbon reduction targets including the CCC's carbon budgets.
16. Paragraph 5.16 states that the CCC's UK carbon budgets take into account an allowance for new national road infrastructure which is compatible with meeting the Climate Change Act target for 2050[4].	
17. Paragraph 5.17 explains that any carbon impacts should be included at the option appraisal stage and as part of the EIA for the DCO application, and that applicants should provide evidence of the carbon impacts and assess them against the carbon budgets.	
18. Paragraphs 5.18 and 5.19 explain how carbon increases from road development are included in the UK carbon budget and state the following: *"any increase in carbon emissions is not a reason to refuse development consent, unless the increase in carbon emissions resulting from the proposed scheme are so significant that it would have a material impact on the ability of Government to meet its carbon reduction targets."* *"Evidence of appropriate mitigation measures (incorporating engineering plans on configuration and layout, and use of materials) in both design and construction should be presented. The Secretary of State will consider the effectiveness of such mitigation measures in order to ensure that, in relation to design and construction, the carbon*	18. Section 15.8 sets out the environmental mitigation measures for the Project and quantifies the adequacy of these measures for reducing impact of the Project on GHG emissions.

[4] At the time of its production the UK Climate Change Act was targeting an 80% reduction by 2050

Summary of NPS Requirement	How and Where Considered in the PEIR
footprint is not unnecessarily high. The Secretary of State's view of the adequacy of the mitigation measures relating to design and construction will be a material factor in the decision-making process."	

National Planning Policy Framework

15.2.15 The National Planning Policy Framework (NPPF) (Ministry of Housing, Community and Local Government, 2021) sets out the planning policies for England. Chapter 14 of the NPPF sets out the approach to meeting the challenge of climate change.

15.2.16 Paragraph 154 of the NPPF states that: '*New development should be planned for in ways that: a) avoid increased vulnerability to the range of impacts arising from climate change. When new development is brought forward in areas which are vulnerable, care should be taken to ensure that risks can be managed through suitable adaptation measures, including through the planning of green infrastructure…*'.

15.2.17 Paragraph 157 states that: '*in determining planning applications, local planning authorities should expect new development to: a) comply with any development plan policies on local requirements for decentralised energy supply unless it can be demonstrated by the applicant, having regard to the type of development involved and its design, that this is not feasible or viable…*'.

15.2.18 The NPPF requires a risk-based approach to avoid vulnerability associated with flood risk and climate change. The methodology outlined in Section 15.4 of this chapter ensures that the vulnerability of the Project to climate change is assessed, and environmental measures are implemented to ensure risks are managed.

15.2.19 Paragraph 155 of the NPPF states that plans should help to increase the use and supply of renewable and low carbon energy and heat by providing a positive strategy for deriving energy from these sources; identifying suitable areas for renewable and low carbon energy sources; and identifying opportunities for the development to draw its energy supply from decentralised, renewable or low carbon energy supply systems and for co-locating potential heat customers and suppliers.

15.2.20 The GHG emissions methodology and assessment described in Sections 15.4 and 15.9 respectively have been developed in line with the NPPF guidance.

Other Relevant National Planning Policy

15.2.21 The Flood Risk and Coastal Change guidance within the National Planning Practice Guidance (NPPG) (Ministry of Housing, Communities and Local Government, 2014) contains climate change allowances to be included in flood risk assessments. These allowances take the form of percentage uplifts for streamflow and precipitation for drainage design.

15.2.22 The UK Aviation Policy Framework (Department for Transport, 2013) outlines the Government's policy framework for the UK aviation sector. With respect to climate change, paragraph 12 states that the UK Government's objective is to: *'ensure that the aviation sector makes a significant and cost-effective contribution towards reducing global emissions'.*

15.2.23 The Aviation 2050 strategy (Department for Transport, 2018b) reviews the climate change policies detailed in the Aviation Policy Framework. This document has recently undergone public consultation and, as such, does not represent currently adopted policy. Paragraph 3.87 of the strategy states that the Government agreed with the (then) CCC's advice to exclude international aviation emissions from carbon budgets but to leave 'headroom' to account for international aviation so that the whole economy is on a trajectory to achieve the 2050 Climate Change Act target[5]. The paragraph also states that:

'To set a clear level of ambition for the sector, the government proposes to: accept the CCC's recommendation that emissions from UK-departing flights should be at or below 2005 levels in 2050.'

15.2.24 2018 Beyond the Horizon - Making best use of existing runways (DfT, 2018d) represents current UK Government policy on aviation and climate change. It sets out the Government's support for airports (other than Heathrow) making best use of their existing runways subject to related economic and environmental considerations being taken into account.

15.2.25 As set out in Section 15.2.7 the recently published recommended Sixth Carbon Budget now includes international aviation.

15.2.26 Decarbonising Transport (the Transport Decarbonisation Plan) (Department for Transport, 2021a) sets out the Government's approach to decarbonising the full transport sector in the UK. The strategic priorities included are across modal shift and active transport; decarbonisation of road transport; decarbonising the freight system; green transport technology and innovation; place-based solutions; and reducing carbon in the global economy. The Plan sets out a wide range of commitments and actions to promote change across these priorities, many of which will directly seek to reduce GHG impacts arising from surface access, freight transportation, direct emissions from airports and, emissions from aircraft. The Plan confirms the UK Government's commitment to ensure continued access to affordable flights and seeks to align this with national carbon commitments through a range of commitments and strategic priorities including:

- consultation on a Jet Zero strategy, setting out the steps to be taken to reach net zero aviation emissions by 2050 (discussed further below);
- inclusion of international aviation in the sixth Carbon Budget;
- the Jet Zero Council to support the delivery of global leadership on the production and commercialisation of Sustainable Aviation Fuels, supported by a potential mandate for blending Sustainable Aviation Fuel (SAF) by 2025;
- consultation on a target for UK domestic aviation to meet net zero by 2040;
- focus on the acceleration of technical innovation in zero emissions aircraft technologies;
- research and development on zero emissions flight infrastructure at UK airports;
- supporting UK airspace modernisation;
- industry mechanisms to reduce sectoral emissions including further development of the UK ETS which covers flights within the European Economic Area (EEA) and flights to/from Gibraltar (potentially to consider other pollutants) and interaction with the global offsetting scheme for aviation, CORSIA;
- international leadership to agree a long-term global emissions reduction goal through the UN International Civil Aviation Organisation (ICAO) by 2022; and

[5] This has now been superseded by the Sixth Carbon Budget recommendations from the CCC, and the inclusion of international aviation within the formal adoption of the Sixth Carbon Budget.

- consideration of how existing market-based mechanisms (UK ETS and CORSIA), as well as the use of new GHG removal technologies, can address residual emissions.

Emerging National Policy

15.2.27 Jet zero consultation: a consultation on our strategy for net zero aviation (Department for Transport, 2021b) was published alongside the Transport Decarbonisation Plan, and sets out the Government's proposed approach and principles to reach net zero aviation by 2050. It sets out the priorities of the UK Government to ensure the decarbonisation of aviation such that the benefits of air travel are preserved, while maximising the benefits that can accrue from aviation sector decarbonisation. The consultation notes the need for clear goals for decarbonisation while acknowledging the pathway to achieve this will require flexibility across technological development, alternative fuels, offsetting and sequestration of carbon, and other measures. It also identifies the role of the UK Government and aviation sector in delivering international leadership in achieving long term goals for GHG emissions.

15.2.28 The consultation includes the potential adoption of a net zero target for UK domestic aviation by 2040 in line with recommendations from the CCC. The consultation also proposes to set a CO_2 emissions reduction trajectory for aviation from 2025 to 2050 against which progress can be monitored.

15.2.29 The consultation sets out five areas of measures for consideration.

- **System efficiencies:** conventional aircraft efficiency improvement; airspace modernisation; and airport operational efficiencies; and mechanisms to encourage improvement in these areas through: target setting, working with airlines, airport charging / slot allocation, Air Navigation Service Provider charging, and stimulation of investment. The consultation proposes that all airport operations in England should be zero emissions by 2040 (Scope 1 and 2 emissions).
- **Sustainable Aviation Fuels**: consultation on a SAF mandate to require blending of SAF with kerosene in addition to potential expansion of the Renewable Transport Fuel Obligation to support SAF production; ensuring a policy framework required to provide confidence to SAF producers; development of SAF standards; use of SAF on Public Service Obligation (PSO) routes; and work to accelerate procurement and use of SAF.
- **Zero Emission Flight (ZEF)**: supporting research and development in zero carbon flight including aircraft technologies and airport infrastructure needs; development of a UK Hydrogen Strategy; working with industry to encourage adoption of zero emission aircraft and aviation technology; an enabling regulatory framework to support ZEF; and use of ZEF on PSO routes.
- **Markets and Removals**: implementing CORSIA in 2024 and ensuring aviation is appropriately considered within the UK ETS; considering inclusion of other pollutants in UK ETS; detailing the UK Govt approach to deploying GHG removal methods including through UK ETS; negotiating for carbon pricing to be maintained and strengthened and incentivising GHG removal methods; and encouraging increased ambition of CORSIA through international negotiation.
- **Influencing Consumers:** potentially mandating provision of environmental information to customers and supporting consumers to make sustainable choices.

15.2.30 The consultation document also specifically addresses non-CO_2 impacts such as contrails and NO_x emissions, acknowledging that the scale of the effect from these has a large degree of

scientific uncertainty. The consultation notes that many measures to improve efficiencies will help to reduce non-CO_2 emissions, and commits to ensuring that the latest scientific knowledge is used to inform aviation policy.

15.2.31 The consultation period began on 14 July 2021 and will run until 8 September 2021. It is understood that the DfT will publish a summary of responses, including the next steps, within three months of the consultation closing. Its output will be considered as necessary as part of the ES supporting the application for development consent.

Local Planning Policy

15.2.32 Gatwick Airport lies within the administrative area of Crawley Borough Council and adjacent to the boundaries of Mole Valley District Council to the north west, Reigate and Banstead Borough Council to the north east and Horsham District Council to the south west. The administrative area of Tandridge District Council is located approximately 1.9 km to the east of Gatwick Airport, while Mid Sussex District Council lies approximately 2 km to the south east. Gatwick Airport is located in the county of West Sussex and adjacent to the county of Surrey.

15.2.33 The most relevant local planning policies applicable to climate change are summarised in Table 15.2.2.2 and explained further in Appendix 15.2.1. For some environmental topics that have informed this chapter, a wider study area has been used and policies in local plans over a wider area have been considered, where appropriate.

Table 15.2.2: Local Planning Policy

Administrative Area	Plan	Policy
Adopted Policy		
Crawley	Crawley 2030: Crawley Borough Local Plan 2015-2030	ENV6 Sustainable design and construction
		GAT1 Development of the Airport with a Single Runway
		SD1 Presumption in favour of sustainable development
		ENV7 District energy networks
Reigate and Banstead	Reigate and Banstead Local Plan: Core Strategy 2014 (Reviewed 2019)	CS10 Sustainable development
		CS11 Sustainable construction
	Reigate and Banstead Development Management Plan 2019	OSR2: Open space in new developments
		CCF1 Climate change mitigation
		CCF2: Flood risk
Mole Valley	Mole Valley Core Strategy 2009	CS19 Sustainable Construction, Renewable Energy and Energy Conservation
Horsham	Horsham District Planning Framework 2015	Policy 35 Climate change
		Policy 36 Appropriate energy use
		Policy 37 Sustainable design and construction
Tandridge	Tandridge District Core Strategy 2008	CSP14 Sustainable construction
		CSP15 Environmental quality

Administrative Area	Plan	Policy
Mid Sussex	Mid Sussex District Plan 2014-2031	DP39: Sustainable Design and Construction
Emerging Policy		
Crawley	Submission Draft Crawley Borough Local Plan 2021-2037	Strategic Policy SD1 Presumption in Favour of Sustainable Development
		Strategic Policy SDC1: Sustainable Design and Construction
		Policy EP1: Development and Flood Risk
Mole Valley	Future Mole Valley 2018-2033 Consultation Draft Local Plan	Policy S1 Presumption in Favour of Sustainable Development
		Policy EN14 Responding to the Climate Emergency
		Policy INF2 Managing Flood Risk
Horsham	Draft Horsham District Local Plan 2019-2036	Strategic Policy 1 – Sustainable Development
		Strategic Policy 37 – Climate Change
		Strategic Policy 40 – Flooding
Tandridge	Our Local Plan: 2033	TLP30 Green and Blue Infrastructure
		TLP47: Sustainable Drainage and Reducing Flood Risk
		TLP45: Energy Efficient & Low Carbon Development

15.3. Consultation and Engagement

15.3.1 In September 2019, Gatwick submitted a Scoping Report (GAL, 2019) to the Planning Inspectorate, which described the scope and methodology for the technical studies being undertaken to provide an assessment of any likely significant effects and, where necessary, to determine suitable mitigation measures for the construction and operational phases of the Project. It also described those topics or sub-topics which are proposed to be scoped out of the EIA process and provided justification as to why the Project would not have the potential to give rise to significant environmental effects in these areas.

15.3.2 Following consultation with the statutory bodies, the Planning Inspectorate (on behalf of the Secretary of State) provided a Scoping Opinion on 11 October 2019 (Planning Inspectorate, 2019).

15.3.3 Key issues raised during the scoping process specific to climate change are listed in Table 15.3.1 together with details of how these issues have been addressed within the PEIR.

Table 15.3.1: Summary of PINS Scoping Responses

Details	How/where addressed in PEIR
Include a description and assessment of significant effects on climate and vulnerability of project to climate change	See Section 15.9
Where relevant, the ES should describe and assess the adaptive capacity that has been incorporated into the design of the Proposed Development. This may include, for example, alternative measures such as changes in the use of materials or construction and design techniques that will be more resilient to risks from climate change.	A description of the adaptive capacity in the Project will be included in the final ES. The PEIR assessment is based on the design at this stage of the Project development. In some cases, adaptive capacity has already been incorporated into the design of certain assets, for example the inclusion of flood resilience measures for surface access assets (see ICCI assessment in Appendix 15.9.2). As the project design is further refined in the build up to application, its adaptive capacity will be further considered and incorporated into the ES. This assessment will be informed by any specific client requirements with respect to adaptive capacity, whether in relation to climate resilience or other factors.
The Inspectorate recommends that the ES assesses the impact on arriving flights to the extent that the new airspace design affects the arriving traffic consistent with the CAP1616a requirements.	Airspace design changes fall under a different regulatory system and consenting process. This PEIR does not include an assessment of international arriving flights as recommendations on their inclusion are only applicable to assessments of airspace design changes. In addition, there is insufficient information on future airspace changes to allow an assessment on GHG emissions to be carried out at this stage. It is proposed to consult with CAA to discuss the scope of the assessment in the EIA process and the final ES will take into account the outcomes of the CAA consultation. Further information is provided in Chapter 4: Existing Site and Operation section 4.5; and in Chapter 6: Approach to Environmental Assessment section 6.2.
The Inspectorate considers that a cumulative assessment should be undertaken, to take into consideration other plans or projects which could result in significant cumulative GHG emissions.	The nature of greenhouse gases is that their impact is not affected by the location of their source. Emissions from proposed developments adjacent to Gatwick are no more relevant than emissions elsewhere in the UK. The measure of cumulative emissions at a national scale is carried out by the

Details	How/where addressed in PEIR
	setting of, and monitoring against, UK climate budgets. Comparison with UK climate budgets is included in the PEIR.
The baseline should be presented within the ES, with appropriate referencing to the existing reports.	The baseline environment is described in Section 15.6
Explain the applicability of the existing Adverse Weather Plan and Flood Management Plan to the assessment of likely significant effects from the Proposed Development and how adherence will be secured.	Mitigation included as part of the Adverse Weather Plan (AWP) has been included within the mitigation section of the CCR assessment (Appendix 15.9.1). There is no separate Flood Management Plan to the AWP.
Use the most up to date Climate Change projection information available and set out the assumptions and uncertainties in all future projections. Explain how future climate conditions have influenced the design of the Proposed Development.	The latest UKCP18 data has been used in the assessment. Details of the data used can be found in Section 15.6. The impact of future climate change conditions on the design of the Project have been described in Section 15.9.
The ES should provide a clear definition for each of the different 'scopes' of emissions reported.	The PEIR makes reference to 'scopes' in Section 15.4.11 where they are referenced and a definition for each is provided. However, GAL does not consider the use of 'scopes' supports a clear assessment of the GHG impacts of the Project. The remainder of the PEIR chapter, and the supporting appendices, illustrate which emissions fall within responsibility of Gatwick Airport Ltd as airport operator, which arise from other parties (such as passengers) and which arise from aircraft.
The Inspectorate acknowledges that technological advances of aircraft, and thus changes to emissions, are difficult to predict with confidence. The Inspectorate welcomes the intention to adopt pessimistic, best practice and central projections for future aviation improvements. The Applicant should ensure that the assumptions made in all GHG calculations (for both construction and operational phases) are clearly set out in the ES.	This chapter of the PEIR provides details on the methodology adopted in Section 15.9, including assumptions made.
The ES should explain how climate change risks relate to the assessment of likely significant effects. Any design commitments that are relied upon should ensure no high risks to the Proposed Development should be appropriately described and secured.	See Section 15.9.
The ES should assess all types of GHGs which have the potential to contribute to a likely significant effect on	It is not considered that other non-Kyoto emissions should be assessed within the ES. This would be inconsistent with how other airport developments

Details	How/where addressed in PEIR
climate, and clearly set out the conversion methodology and assumptions where tCO2e metrics are used.	have been assessed. Further information is included in the PEIR to explain why non-Kyoto emissions are excluded in Section 15.4.7. This will be discussed further during the EIA process.
The Inspectorate would expect to see the 'worst case' year presented as a separate assessment scenario which should be considered against a do-nothing scenario for that same year.	An assessment of the 'worst case' year for GHG emissions, and a comparison against the future baseline, is included in Section 15.9.
Therefore, the difference in GHG emissions from the 'do-nothing' and 'do-something' scenarios will be calculated and will be compared against relevant carbon budgets. The ES should assess the likely significant effects associated with any increase in GHG emissions as a result of the Proposed Development and with reference to relevant legislation and sector specific carbon budgets.	The PEIR presents the absolute magnitude of emissions and also the difference between these emissions and the baseline conditions. Emissions are then assessed against the relevant carbon budgets. For the PEIR the emissions are presented without mitigation implemented. In the ES the reported impacts will take into account best available knowledge of the impacts and innovations in reducing emissions from aircraft (technological improvements in aircraft and changes in fuels).
The ES should quantify the GHG impacts before and after mitigation to show the anticipated effectiveness of the proposed mitigation. Any mitigation relied upon to reduce the significance of effect should be demonstrably secured.	The PEIR does not present quantified mitigation. This will be presented in the final ES and will incorporate mitigation during the construction phase, but also during operation. The mitigation provided in the ES will draw from the Carbon and Climate Change Action Plan currently in development which will also be submitted alongside the development consent submission. Mitigation will also reflect the surface access and energy strategies developed for Gatwick. The range of mitigation opportunities being considered are set out in Section 15.8.3.

15.3.4 Key issues raised during consultation and engagement with interested parties specific to this topic are listed in Table 15.3.2, together with details of how these issues have been addressed within the PEIR.

Table 15.3.2: Summary of Consultation

Consultee	Date	Details	How/where addressed in PEIR
Local Authorities			
Crawley Borough Council, Reigate and Banstead Borough Council, Mole Valley District	28 August 2019	Meeting of local authorities, Gatwick Airport Ltd and air	No change was made to the scope of the assessment in

Consultee	Date	Details	How/where addressed in PEIR
Council, West Sussex County Council, Surrey County Council, Horsham District Council, Mid Sussex County Council, East Sussex County Council, Kent County Council		quality, climate change and GHG topic leads. Clarification sought on the scope of GHG emissions assessment for aircraft. Additional information was provided to the local authority which made the enquiry.	response to this. No issues arose for the CCRA and ICCI.
Wider Stakeholders			
Brighton and Hove City Council, Wealden District Council, Sevenoaks District Council, Royal Borough of Windsor and Maidenhead, Greater London Authority, Highways England, Historic England, Charlwood Parish Council, Horley Town Council	3 September 2019	Scope of EIA topic assessment for air quality, climate change and carbon topics	No issues arose for the assessment of climate change and carbon.
Crawley Borough Council, Reigate and Banstead Borough Council, Mole Valley District Council, West Sussex County Council, Surrey County Council, Horsham District Council, Mid Sussex District Council	27 January 2020	The purpose of the meeting was to provide an update on emerging findings of the assessment (at that time), ahead of the then planned formal statutory consultation in Spring 2020.	Whilst questions were asked about the assessment no further issues arose for the assessment.
Crawley Borough Council, Surrey County Council, Reigate and Banstead Borough Council, Tandridge District Council, Horsham District Council, Mid Sussex District Council, East Sussex County Council, Kent County Council, West Sussex County Council	12 August 2021	The purpose of the meeting was to provide an update on emerging findings of the assessment ahead of the formal statutory consultation in Autumn 2021.	Whilst questions were asked about the assessment no further issues arose for the assessment.

15.4. Assessment Methodology

Relevant Guidance

15.4.1 In addition to the requirements of the EIA Regulations, the following guidance relevant to CCR, ICCI and GHG assessments has been considered. The updated Design Manual for Roads and Bridges (DMRB) provides standards for the assessment of highways schemes. The DMRB underwent an update in 2019 and now contains a separate section on climate (GHG emissions and CCAR) (Highways England *et. al.*, 2019). The revised DMRB text is in line with the guidance from the ANPS and therefore the assessment of this chapter already reflects the requirements of the updated revised DMRB.

Table 15.4.1: Technical Guidance Relevant to the Climate and Carbon Assessments

Relevant topic	Technical guidance
Climate change (CCRA and ICCI)	Institute of Environmental Management and Assessment (IEMA) (2020) Climate Change Resilience and Adaptation
	International Civil Aviation Organization (ICAO) (2010): Environmental Report 2010. Chapter 6: Adaptation
	Airports Cooperative Research Programme (ACRP) (2015): Climate Change Adaptation Planning: Risk Assessments for Airports
	Civil Aviation Authority (CAA) (2014): Review of Operational Resilience at Heathrow and Gatwick
	Climate Change Adaptation Report (Civil Aviation Authority, 2015). CAP 1363
	Climate Change Adaptation Report – At Gatwick Airport (GAL, 2011)
	Climate Change Adaptation Progress Report (GAL, 2016)
	Committee on Climate Change (2017) UK Climate Change Risk Assessment Evidence Report
	Chartered Institution of Building Services Engineers (CIBSE) (2014) Technical Memorandum 49: Design Summer Years for London
	UKCP18 Science and user guidance reports. https://www.metoffice.gov.uk/research/collaboration/ukcp/guidance-science-reports
Greenhouse Gas (GHG) Assessment	The Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance (IEMA, 2017)
	The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (World Business Council for Sustainable Development (WBCSD) and World Resources Institute (WRI) (2015)
	Net Zero – the UK's contribution to stopping global warming (CCC, 2019)
	The Sixth Carbon Budget (CCC,2020)
	PAS 2080 Carbon Management in Infrastructure (British Standards Institute (BSI) 2017)
	BS EN 15978 Sustainability of construction works (BSI, 2011)
	The Royal Institution of Chartered Surveyors (RICS) Methodology to calculate embodied carbon (RICS, 2014)
	Scope of carbon budgets: Statutory advice on inclusion of international aviation and shipping (CCC, 2012)

Relevant topic	Technical guidance
	EMEP/EEA Air Pollution Inventory Guidebook (EEA, 2016)
	CORSIA (Carbon offsetting and Reduction Scheme for International Aviation) (ICAO, 2016)
	Aircraft Engine Emissions Databank (AEED) (ICAO) (EASA, 2019)
	Fifth Assessment Report (AR5) Synthesis Report (Intergovernmental Panel on Climate Change (IPCC), 2014)

Scope of the Assessment

15.4.2 The scope of the assessment set out in this chapter of the PEIR has been developed in consultation with relevant statutory and non-statutory consultees as detailed in Table 15.3.1 and Table 15.3.2.

15.4.3 Taking into account the scoping and consultation process, Table 15.4.2 summarises the issues considered as part of this assessment.

Table 15.4.2: Issues Considered within the Assessment

Activity	Potential Effect
Climate Change Adaptation and Resilience: Construction Phase	
Construction and demolition activities within the existing airport boundary and construction of upgraded highway junctions	Climate change – extreme weather/climatic events (winds, heatwaves, droughts, intense rainfall events) exacerbating health and safety of construction workers and impacts on nearby sensitive community receptors (CCR and ICCI assessments).
	Climate change – extreme weather/climatic events (winds, heatwaves, droughts, intense rainfall events) exacerbating environmental impact effects to air, land, biodiversity, water, and human health receptors (ICCI assessment).
Delivery of construction and demolition activities within existing airport boundary, including construction of upgraded highway junctions	Climate change – extreme weather/climatic events (winds, heatwaves, droughts, intense rainfall events) negatively affecting performance of construction equipment/delays to construction programme (CCR assessment).
Climate Change Adaptation and Resilience: Operational Phase	
Performance of the Project with respect to climate change resilience and adaptation.	Climate change - change in seasonal patterns (rainfall and temperatures) affecting soil moisture, flora growing season, green infrastructure (ICCI and CCR assessments).
	Climate change – extreme weather/climatic events (winds, heatwaves, droughts, intense rainfall events) exacerbating environmental impacts to air, land, biodiversity, water, and human health receptors (ICCI assessment).
	Climate change - change in seasonal patterns (rainfall and temperatures) affecting health and safety (CCR assessment).

Activity	Potential Effect
	Climate change - High temperatures, heatwave, high intensity rainfall events, snowfall and/or flooding affecting aircraft operations, airport infrastructure (eg drainage), utilities/service resilience and upgraded highway junctions (CCR assessment).
Mitigation areas beyond existing airport boundary	Climate change - change in seasonal patterns (rainfall and temperatures) affecting soil moisture, flora growing season, green infrastructure (ICCI assessment).
	Climate change – extreme weather/climatic events (winds, heatwaves, droughts, intense rainfall events) exacerbating environmental impacts to air, land, biodiversity, water, and human health receptors (ICCI assessment).
GHG Emissions Assessment: Construction Phase	
GHG emissions arising from construction and demolition activities within the existing airport boundary, and construction of upgraded highway junctions and any other buildings/infrastructure outside the airport boundary included in the Project description	GHGs arising from the extraction, processing and manufacturing of construction materials.
	GHGs arising from transportation of materials from factory to site.
	GHGs arising from energy use in construction activities (ie operation of plant etc.).
	GHGs arising from transport and disposal of construction and demolition waste.
	GHGs arising from surface access for construction staff arising from the Project.
GHG emissions arising from Land use change	Loss of carbon sink from soil organic carbon and changes arising from removal/addition of ground vegetation.
GHG Emissions Assessment: Operational Phase	
GHG emissions arising from air transport	GHGs arise from aircraft in the LTO phases for: ▪ flights departing Gatwick: taxi-out; take-off roll; initial climb; climb-out (to 915 m[6]); and ▪ flights arriving to Gatwick: approach (from 915 m); landing roll; reverse thrust; taxi-in.
	GHGs arising from departing flights in CCD phase.
GHG emissions arising from surface access journeys from employees, passengers, and freight	GHGs arising from passenger surface access (rail, road).
	GHGs arising from staff surface access (rail, road).
	GHGs arising from freight surface access (rail, road).
GHG emissions arising from the use of airport, buildings and facilities	GHGs arising from energy (fuel, electricity) use for airport buildings, GSE, APUs, GPU, and FEGP.
	GHGs arising from firefighting activities.
	GHGs arising from aircraft engine testing.
	GHGs arising from supply of potable water.
	GHGs arising from pumping and treatment of wastewater.

[6] 3,000 ft

Activity	Potential Effect
	GHGs arising from waste treatment and disposal.
	GHGs arising from other use of aviation fuels within the airport boundary not listed above (eg helicopter usage).

15.4.4 The definitions that have been used to define the asset and asset types for the Project and the hazards that have been scoped in as part of the CCR assessment are included in Appendix 15.4.2.

15.4.5 For the ICCI assessment, a list of the topics and receptors scoped in can be found in Appendix 15.4.2. The ICCI assessment has been deemed as not relevant to Major Accidents and Disasters because a consideration of climate change is included as part of the natural hazards assessment.

15.4.6 Effects which are not considered likely to be significant have been scoped out of the assessment. For the CCRA, effects of sea level rise have been scoped out due to the inland location of Gatwick Airport, which means it is not at risk of coastal flooding. In its scoping opinion, PINS has agreed to sea-level rise being scoped out of the assessment (Planning Inspectorate, 2019).

15.4.7 For the assessment of GHG emissions, no effects have been scoped out of the assessment. The assessment focuses on GHGs as set out in the Kyoto Protocol, and the resultant international commitments and UK legislation, and considers emissions in terms of CO_2e, except for aviation emissions which consider both CO_2 (in line with wider practice and national reporting conventions on aviation) and CO_2e where relevant to reporting against targets[7]. The issue of Radiative Forcing (RF) and non-CO_2 impacts from aviation are recognised in corporate reporting guidance in the UK and are referenced within the CCCs Sixth Carbon Budget and in the recent Jet Zero consultation document. However, the supporting information for these documents notes that while a multiplier can be used to provide a short-term estimate of their impact, this does not reflect the actual long-term impact of these emissions – which are not directly analogous to CO_2 impacts. There is no well-established methodology for quantifying non-CO_2 emissions impacts, and uncertainty on the magnitude of their impact, and providing a comparative set of figures alongside the CO_2 emissions would be incompatible with an assessment against national CO_2 targets. This assessment, therefore, does not attempt to quantify non-GHG and RF effects of emissions at altitude, although the likelihood of these contributing to changes in climate are acknowledged. It is likely, however, that many of the measures to improve aircraft efficiencies, to make use of sustainable aviation fuels, and to transition to zero emissions flight, will have a positive impact on non-CO_2 impacts. The consideration of non-CO_2 emissions impacts, and how these are assessed and reflected in wider policy development and climate change strategy, will be kept under review in the preparation of the ES.

15.4.8 There is currently no internationally agreed way of allocating international aviation CO_2 emissions to individual countries. However, the United Nations Framework Convention on Climate Change (UNFCCC) provides a recommended approach, which is to allocate aviation emissions to the country of departure. The UK emissions inventory does not include international aviation emissions in the emissions total for the UK, although they are included as an additional

[7] GHG emissions from aviation fuel are predominantly CO_2 emissions. Converting CO_2 emissions to CO_2e emissions for aviation fuel increases the overall value by approximately 1%, most of which is due to emissions of N_2O.

memorandum item (in line with international reporting protocols for the EU and under the UNFCCC).

15.4.9 Guidance is provided by the Civil Aviation Authority (CAA) for the regulatory process for changing airspace design (CAA, 2018a) which recommends inclusion of both arriving and departing aircraft in all flight phases where there would be an airspace change. However, this chapter of the PEIR is assessing the Project without inclusion of airspace design change (which would be considered under a different regulatory regime, if required). The approach adopted in the PEIR has been to quantify the emissions associated with outward flights only. This effectively allocates emissions to the departing airport location and avoids double counting at a national and international level. For LTO emissions the relevant GHG emissions are those for take-off from Gatwick and landing at another airport. For the purposes of the assessment (and in the absence of data on other airports) the assumption is that landing emissions from inbound flights at Gatwick are equal and equivalent to the landing emissions for outbound flights at destination airports. The Air Quality assessment has assessed LTO emissions in the vicinity of Gatwick (landing emissions for inbound flights, and take-off emissions for outbound flights) and the total of these is assumed to be equal and equivalent to the sum of take-off emissions at Gatwick and landing emissions at destination airports for all outbound flights. In this way total outbound LTO emissions can be estimated. Outbound CCD emissions have then been calculated separately and added to LTO emissions to provide the total outbound GHG emissions. This approach provides consistency with national reporting in that domestic flight emissions are attributable to the origin airport location, and that international flights are attributable to the origin country. It also aligns with the UK emissions inventory approach which quantifies domestic aviation emissions, and accounts for emissions associated with international bunker fuel sales (ie fuel purchased for outward international flights).

15.4.10 In summary, the quantification includes or excludes the aviation emissions sources shown in Table 15.4.3.

Table 15.4.3: Aviation Emissions Sources for GHG Assessment

	Outward flights			Inward flights		
	Taxi out and take-off from Gatwick Airport	**CCD aloft**	**Landing and taxi in at other airport**	**Taxi out and take-off from other airport**	**CCD aloft**	**Landing and taxi in at Gatwick Airport**
Domestic flights	Included	Included	Excluded	Excluded	Excluded	Included
International flights	Included	Included	Excluded	Excluded	Excluded	Included

15.4.11 The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (WBCSD/WRI, 2015) defines three ‘scopes’ of emissions that are used for corporate reporting. Broadly these scopes can be summarised as follows.

- **Scope 1:** direct emissions of GHGs from plant, equipment, vehicles owned by the reporting corporate entity (eg combustion of natural gas, vehicle fuels, and emissions of refrigerants).

- **Scope 2:** indirect emissions of GHGs associated with purchased electricity, steam, heating and cooling (purchased by the reporting corporate entity).
- **Scope 3:** other GHG emissions arising from the activities of the organisation including those associated with construction, transportation and distribution, waste, water, business travel, employee commuting.

15.4.12 Reporting the emissions for the Project against these scopes is complex (and of limited value for this PEIR) as the GHG Protocol is intended as guidance for corporate reporting, and the Project incorporates emissions from multiple corporate entities. As an example, the use of aviation fuel for a flight is a Scope 1 emission for the operating airline but would be classed as a Scope 3 emission for Gatwick Airport Ltd (were they to report it). For this reason, limited reference is made to which emissions fall under Scopes 1/2/3, but where this reference is made it is from the perspective of the most relevant corporate reporting entity, Gatwick Airport Ltd.

Study Area

15.4.13 The study area for the CCR assessment is the Project site boundary and upgraded highway junctions. The construction assessment also includes any areas of land required temporarily for construction. Figure 1.3.1 of the PEIR shows the Project site boundary including the highways works.

15.4.14 The study area for the ICCI corresponds to the study area boundaries defined for each of the environmental topics considered in the EIA process (refer to relevant chapters of this PEIR, from Chapter 7 to Chapter 18).

15.4.15 The study area for the GHG assessment considers the emissions of GHG arising from the construction and operation of the Project, some of which are emitted within the site boundary, but the majority of which are emitted outside of the boundary. This covers both construction and operational emissions as summarised in the list below.

- For construction emissions, the physical scope extends to the extraction and sourcing of materials nationally and internationally, as well as construction processes within the Project site boundary. Transportation of waste, and transport of workers to the Project also take place outside the Project site boundary.
- For the operational phase, emissions arise from the energy, waste arisings and water consumed within the Project site boundary. However, many of the upstream emissions associated with these (eg energy for electricity generation and potable water treatment) are outside the physical boundary of the Project site.
- Emissions from aviation and from surface access during operation also arise primarily outside the physical boundary of the Project site.

Temporal Scope

15.4.16 The potential impacts of climate change increase over time. Consequently, in the assessments of ICCI and CCR in this chapter, the potential impacts experienced by the receptor or asset will be largest at the end of the Project or asset design life. Where assets are assumed to be in operation in perpetuity, potential impacts will be greatest at the furthest extent of the UKCP18 projections (Met Office, 2018a).

15.4.17 Construction works are planned to commence in 2024 and activities will be phased over a period of 14 years. The 2020-2049 (2030's) time period (see paragraph 15.4.19 below) is used for construction activities for both the ICCI and CCR assessments to represent a reasonable worst-case approach.

15.4.18 For receptors or assets that are in place in perpetuity, the end of the 21st century is taken as the most relevant time to assess climate change impacts in-line with the UKCP18 projections (Met Office, 2018a). Therefore, the 'core' assessment years (key years relating to milestones in the construction and operation phases of the Project) are not relevant to the assessment. Instead, the assessment has used a later period, the 2050-2079 (2060's), as it represents a more conservative time period. This time period has been selected because information regarding extreme climate events for receptors and assets assessed in the ICCI and CCR assessments, are not available in UKCP18 beyond 2079. The limitations of the ICCI and CCR assessments are described in Section 15.5.

Methodology for Baseline Studies

Desk Study

Climate Change Adaptation and Resilience

15.4.19 Information regarding current and projected future climate conditions has been used in the ICCI and CCR assessments. Three sets of climate data have been assembled:

- current climate conditions – based on observed weather observations;
- future climate scenario for 2020-2049 ('2030s'); and
- future climate scenario for 2050-2079 ('2060s').

15.4.20 These climate data sets are based on the Met Office's UKCP18, which are the most recent and comprehensive climate change projections for the UK. In addition to projections for future climate they also contain a comprehensive set of observed historical climate observations. These data are described in more detail in Section 15.6 of this chapter.

15.4.21 As mentioned above, the 2030s future time period encompasses the future baseline period for construction, whilst the 2060s future time period is used to assess a worst-case climate change scenario for the operational phase of the Project for the receptors and assets assessed in the ICCI and CCR assessments.

15.4.22 The CCR assessment does not have a baseline as such, as it relates only to the new development. The CCR assessment is however informed by assessments that have been carried out for the existing infrastructure of the airport by Gatwick through its Adaptation Reporting to Defra (GAL, 2011; GAL, 2016).

GHG Emissions Assessment

15.4.23 The general approach to estimating GHGs for the Project has been to adopt a worst-case assessment of emissions so as to avoid under-estimation of impact. The approach has been to quantify GHG emissions based on the generalised formula combining:

- **activity data** – a measure of the quantity of an activity; and
- **GHG factor** – a measure of the GHG emissions per unit of activity.

15.4.24 Activity data depend on the specific activity being assessed and the way they are quantified, eg:

- fuel consumption is typically quantified in litres or tonnes;
- energy consumption is typically quantified in kWh;
- transport activity is typically measured in vehicle.km or passenger.km; and
- construction materials and waste are quantified in m^3 or tonnes.

15.4.25 GHG factors are drawn from national and international sources. Where these factors are expected to change over the duration of the Project then a time-based factor is used, based on understanding the extent and rate at which the factor would increase or reduce.

15.4.26 The baseline year is the calendar year 2018[8]. Baseline activity data reflect actual usage and consumption in the calendar year 2018 as recorded by Gatwick Airport or other parties. Data have been collected from several sources including corporate reporting (GAL, 2018), historic flight records from Gatwick Airport, and UK CAA travel surveys. For some activities (eg operation of buildings not owned/managed by GAL) it has been necessary to seek data from those third-party operators. A conservative approach has been taken in all such cases to avoid as far as possible under-estimation of GHG emissions.

15.4.27 In the absence of actual consumption data for specific activities it has been necessary to draw on benchmark information to understand typical operations. A full list of data sources is set out in Appendix 15.4.1. A conservative approach has been taken in all such cases to avoid as far as possible under-estimation of GHG emissions.

15.4.28 The future baseline GHG emissions (in the absence of the Project) are based on developing forecasts of activity data. In many cases these are developed by scaling the 2018 baseline activity data linearly using forecasts of passenger numbers.

15.4.29 The future baseline accounts for expected changes to GHG factors for key activities – namely the decarbonisation of the national electricity grid, and improvements to the efficiency of road vehicles. The future baseline also considers other national scale changes affecting emissions, most notably the expected change in road vehicle usage away from fossil fuels and to electric vehicles. The projected emissions from aviation include for the change of fleet over time to aircraft with increased engine efficiency. However, the projected emissions do not include any consideration of SAF within the operation of aircraft, or other improvements such as uptake of electrical or hydrogen powered aircraft, which are expected to be in operation over the timeframe of the project for some domestic and short haul flights.

15.4.30 The key future baseline emissions have been forecast as follows:

- future baseline construction emissions will incorporate planned construction projects which are already consented and are expected to be carried out in the absence of the Project;
- air traffic movements[9] (ATMs) are forecast to increase in the absence of the Project, and these increases are included in the future baseline;
- energy and water use, waste generation and wastewater production, will increase at the airport due to increased passenger numbers in the absence of the Project; and

[8] 2018 is being used for the GHG assessment to align with other topics assessed using similar modelling years and outputs, most pertinently Air Quality assessment work developed on the 2018 road traffic information.
[9] For the purposes of this chapter 'Air Traffic Movements' or ATMs refers to commercial air traffic movements and other aircraft movements (such as business aviation and occasional positioning flights). Hereinafter for the purpose of this chapter all references to ATMs include all such aircraft movements.

- surface access for passengers, staff and freight will also increase in the absence of the Project, and the emissions arising from these are included in the future baseline.

15.4.31 The scaling approach for baseline emissions sources is set out in Table 15.4.4.

Table 15.4.4: Scaling Approach for Future Baseline Assessment

Emissions Source	Scaling Methodology for Future Baseline
Construction Phase (including Demolition)	
GHGs arising from the extraction, processing and manufacturing of construction materials	Future baseline emissions from construction are based on planned construction in the absence of the Project, which will include an extension to Pier 6, construction of two multi-storey car parks, and the extension to South Terminal International Departures. Based on project parameters and building footprints, estimates of construction materials have been developed using typical building benchmarks. These have then been used to estimate construction plant energy and other emissions associated with construction activities.
GHGs arising from transportation of materials from factory to site	
GHGs arising from energy use in construction activities (eg operation of plant etc.)	
GHGs arising from transport and disposal of construction and demolition waste	
GHGs arising from surface access for construction staff arising from the Project	
Loss of carbon sink from soil organic carbon and changes arising from removal/addition of ground vegetation	
Operational Phase	
GHGs arising from aircraft in the Landing LTO phases for: Flights departing Gatwick: taxi-out; take-off roll; initial climb; climb-out (to 915 metres); and Flights arriving to Gatwick: approach (from 915 metres); landing roll; reverse thrust; taxi-in.	Future baseline emissions from aviation have not been linearly scaled. They are based on forecast future ATMs in the absence of the Project. Forecasting of future ATMs includes consideration of the aircraft in use for different flights with modelling of LTO and CCD emissions then based on these forecast flight/aircraft numbers.
GHGs arising from departing flights in CCD phase	
GHGs arising from passenger surface access (rail, road)	The future baseline has been developed by scaling 2018 surface access emissions by forecast passenger numbers in the absence of the Project.
GHGs arising from staff surface access (rail, road)	
GHGs arising from freight surface access (rail, road)	The future baseline has been developed by scaling 2018 estimated freight transport by the forecast increases in cargo freight tonnage in the absence of the Project. The future baseline does not yet include retail freight although this will be included in the final ES.
GHGs arising from energy (fuel, electricity) use for airport buildings, GSE, APUs, GPU, and FEGP	Future baseline emissions from operational energy have not been linearly scaled. The future baseline in the absence of the Project has been produced as part of the preliminary energy strategy development for the airport that takes into

Emissions Source	Scaling Methodology for Future Baseline
	account expected changes in building regulations, improvements to the existing estate performance, changes in energy supply strategy, and decarbonisation of the electricity grid.
GHGs arising from firefighting activities	The future baseline emissions from firefighting activities within the fire training ground were developed as part of the air quality assessment and reference should be made to the methodology in Chapter 13: Air Quality.
GHGs arising from aircraft engine testing	The future baseline emissions from aircraft engine testing activities were developed as part of the air quality assessment and reference should be made to the methodology in Chapter 13: Air Quality.
GHGs arising from supply of potable water	The future baseline has been developed by scaling 2018 water supply emissions by forecast passenger numbers in the absence of the Project.
GHGs arising from pumping and treatment of wastewater	The future baseline has been developed by scaling 2018 wastewater emissions by forecast passenger numbers in the absence of the Project.
GHGs arising from waste treatment and disposal	The future baseline has been developed by scaling 2018 waste management emissions by forecast passenger numbers in the absence of the Project.
GHGs arising from other use of aviation fuels within the airport boundary not listed above (eg helicopter usage).	The future baseline emissions from other aviation fuel use was developed as part of the air quality assessment and reference should be made to the methodology in Chapter 13: Air Quality.

Site-Specific Surveys

15.4.32 No site-specific surveys have been, or will be, conducted for the CCR, ICCI and GHG assessments.

Assessment Criteria and Assignment of Significance

Climate Change Resilience

15.4.33 The CCR assessment considers the resilience of the Project to the physical impacts of climate change.

15.4.34 IEMA guidance defines climate change resilience as the '*ability to respond to changes in climate. If a receptor or project has good climate change resilience, it is able to respond to the changes in climate in a way that ensures it retains much of its original function and form. A receptor or project that has poor climate change resilience will lose much of its original function or form as the climate changes*'.

15.4.35 The CCR assessment differs from many other EIA topics in that it considers how the resilience of a development is affected by an external factor (climate change) not how environmental receptors

are affected by a development's impacts. Consequentially, the CCR impacts cannot be assigned significance with respect to the severity of impacts in the same way as for the other environmental topics. Instead a risk-analysis based approach has been used for the CCR assessment.

15.4.36 The risk assessment uses a combination of likelihood of climate impacts occurring and the potential consequence of those impacts to determine risk according to a five-point scale: very low, low, medium, high or very high. Any impacts determined to be high or very high risk have been identified as requiring mitigation. For the purposes of the CCR, the 2060s Future Climate Scenario (paragraph 15.4.19) has been used.

15.4.37 The methodology for the CCR risk assessment is as follows:

- identify the receptors (eg assets and asset groups) included within the Project that would be potentially at risk from climate change impacts;
- identify climate change hazards (eg floods, heatwaves, droughts) that may affect the geographical location of the Project;
- determine the likelihood of climate change hazards (eg floods, heatwaves, droughts) occurring in the future, based on the future climate change projections;
- determine the likelihood of the hazard having a climate change impact on the receptors, noting that:
  - the likelihood of each impact was determined based on the definitions in Table 15.4.5.
  - the assessment was qualitative using expert judgement and in discussion with the design team, with the exception of flood risk for which quantitative assessments have been carried out;
  - existing or embedded mitigation and enhancement measures have been taken into account in the assignment of a likelihood category;
- determine the consequence of each impact based on the definitions in Table 15.4.6; and
- determine the risk level based on a combination of likelihood and consequence based on the risk matrix given in Table 15.4.7.

Table 15.4.5: Criteria to Assess Likelihood of Climate Change Impact

Level of Likelihood	Definition of Likelihood
Very unlikely	It is highly improbable that the impact will occur during the operational phase of the assets or systems or the construction phase.
Unlikely	Impact is not expected to occur during the operational phase of the assets or systems or the construction phase.
As likely as not	Impact may occur during the operational phases of the assets or systems or the construction phase.
Likely	Impact is expected to occur during the lifespan of the assets or systems or the construction phase.
Very likely	It is highly probable that the impact will occur during the lifetime of assets or systems or the construction phase.

Table 15.4.6: Criteria Used to Assess Consequence of a Climate Change Impact

Consequence Rating	Disruption	Public perception	Financial	Safety	Damage
Minimal	Minor service disruption within a single day (<30 mins).	Short-term adverse local stakeholder reaction.	Negligible financial loss.	Minor harm or near miss – no adverse human health effects or complaints.	No damage to assets.
Minor	Minor service disruption for multiple days or delays up to two hours on a single day.	Adverse local media reports over sustained period; localised stakeholder concern.	Additional operational costs. Minor financial loss.	Lost time injury or medical treatment, short term impact on persons affected.	No permanent damage. Some restoration work required.
Moderate	Service delays of up to two hours for multiple days or major delays (>two hours) on a single day.	Significant local and/or regional reports including social media. National media interest creating public concern.	Moderate financial loss.	Long term injury or illness, prolonged hospitalisation or inability to work.	Widespread damage and loss of service. Damage recoverable by maintenance and minor repair. Partial loss of local infrastructure.
Major	Service closed for one day or major delays for multiple days.	Negative national reporting and public disputes with key stakeholders, utility companies or other governmental agencies such as the Environment Agency.	Major financial loss.	Single fatality/multiple long-term injuries – emergency response.	Extensive damage requiring extensive repair.
Catastrophic	Service closed for multiple days.	Extensive and prolonged negative reporting nationally and/or public disputes with key stakeholders.	Significantly high financial loss.	Multiple fatalities – emergency response.	Permanent damage and/or loss of service. Retreat and translocation of development

Table 15.4.7: Risk Levels as a function of combined likelihood and consequence

Likelihood	Consequence				
	Minimal	Minor	Moderate	Major	Catastrophic
Very unlikely	Very low	Very low	Low	Low	Medium
Unlikely	Very low	Very low	Low	Medium	Medium
As likely as not	Low	Low	Medium	High	High
Likely	Low	Medium	Medium	High	Very high
Very likely	Medium	Medium	High	Very high	Very high

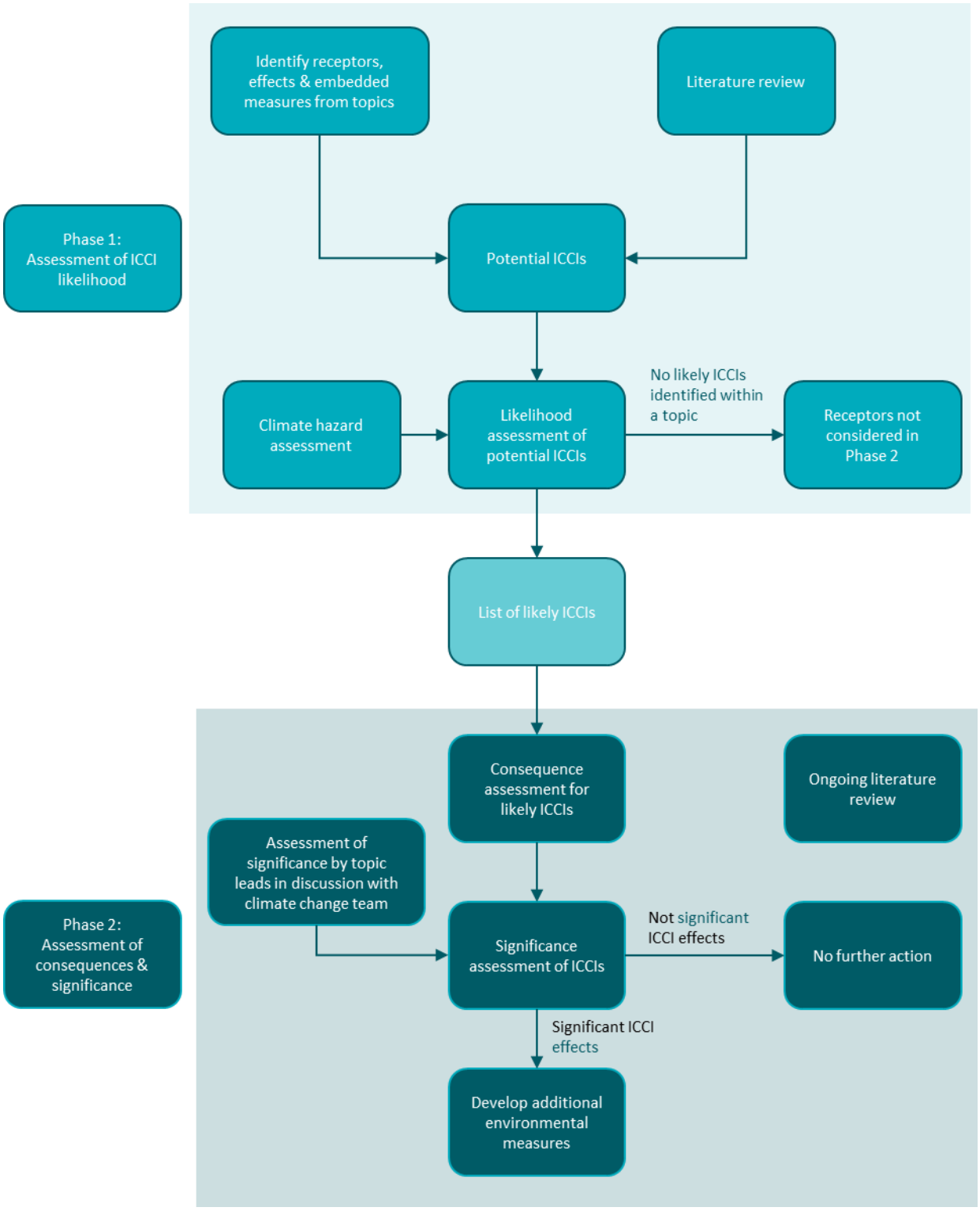
In-combination Climate Change Impacts

15.4.38 The ICCI assessment assesses the extent to which climate change exacerbates an effect on an environmental receptor listed in Table 15.4.3 in Appendix 15.4.2.

15.4.39 The ICCI assessment methodology has been developed in line with the Institute of Environmental Management and Assessment (IEMA) – 'Environmental Impact Assessment Guide to Climate Change Resilience and Adaptation' (IEMA, 2020).

15.4.40 Key terminology used within the ICCI assessment is presented in Appendix 15.4.2. The ICCI assessment follows the same approach to assessing impacts and determining significance as for each of the PEIR topics, but with the added consideration of future climate change projections. The methodology for the ICCI assessment is described in Diagram 15.4.1.

Diagram 15.4.1 Methodology for ICCI assessment



Phase 1 Assessment of In-combination Climate Change Impact Likelihood

15.4.41 Phase 1 aims to screen out any ICCIs that are considered too unlikely to occur, eg climate change hazard does not influence the impact identified by the topic, and therefore do not require further assessment.

15.4.42 It considers the effects already identified by environmental topics based upon their own impact assessment methodologies. It also identifies any embedded environmental measures proposed by the environmental discipline and the engineering and design teams.

15.4.43 A list of potential ICCIs was collated based on:

- the initial assessment from the other PEIR disciplines based on their own assessment methodologies; and
- a literature review of recent guidance, science and policy relating to climate change impacts on the relevant receptors.

15.4.44 The likelihood of each potential ICCI occurring was assessed using expert judgement based on two factors.

- The likelihood of the climate impact occurring, based on the climate hazard assessment.
- The likelihood of the climate impact changing an effect already identified by another PEIR discipline. This assessment was based on the literature review and expert judgement of the climate and environmental specialists. In assessing likelihood, the embedded environmental measures were also considered.

15.4.45 Due to the uncertainties involved, the potential ICCIs were assessed to be either ‘likely’ or ‘unlikely’. Where the ICCI was deemed ‘unlikely’, either due to the climate impact being unlikely to occur or there being a weak link between the climate impact and the effect on a receptor, it was not taken forward to Phase 2.

Phase 2 Assessment of Consequence and Significance

15.4.46 Phase 2 assessed the consequence of the likely ICCIs identified in Phase 1, thus enabling a determination of significance for each.

15.4.47 The assessment of significance was completed by the climate change specialist and environmental specialist from the relevant disciplines working together to provide a qualitative assessment of consequence and therefore significance of the ICCI.

15.4.48 The PEIR disciplines use different criteria for determining significance, so there is no single approach to determining the significance of an ICCI. The effect of an ICCI has been considered significant if:

- an effect which was previously not significant becomes significant against the significance criteria used by the discipline due to climate change (eg an increase in consequence of effect or an increase in scale of change); and/or
- an existing significant effect is exacerbated against the significance criteria used by the discipline due to climate change (eg a further increase in the consequence of effect or a further increase in scale of change).

15.4.49 If an effect was not previously significant and any exacerbation by climate change does not change this, the ICCI effect is not significant.

15.4.50 The spatial extent, duration and time horizon of the climate change impact were considered when determining whether the effect of the Project on the environmental receptor in question would be greater because of the impact of climate change. Embedded environmental measures have been included within the assessments of significance.

15.4.51 The exception to this approach is the assessment for flood risk and drainage design. A separate FRA (Appendix 11.9.1) is being carried out, which is quantitative and follows current Environmental Agency guidance on climate change allowances for all forms of flood risk.

GHG Emissions Assessment

15.4.52 Guidance on assessing the significance of GHG emissions is set out in a number of documents:

- Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance (IEMA, 2017).
- Airports NPS: new runway capacity and infrastructure at airports in the South East of England (Department for Transport, 2018a).
- Airports NPS – Appraisal of Sustainability (Department for Transport, 2018c).

15.4.53 In line with IEMA guidance (IEMA, 2017) all GHG emissions are considered significant due to the permanent, cumulative nature of GHG emissions. However, this guidance also sets out the requirement to provide context for the emissions quantification (in terms of relevant sectoral, local or national carbon budgets) and to provide information on carbon mitigation measures.

15.4.54 In May 2019 the CCC recommended that the UK should set and pursue a net-zero GHG target to respond to the latest climate science and fully meet the UK's obligations under the Paris Agreement. The UK Government responded by introducing a Statutory Instrument (June 2019) that changed the Climate Change Act 2008 target from an 80 per cent reduction against a 1990 baseline to a 100 per cent reduction (net-zero). The Sixth Carbon Budget was the first to reflect the change in the long-term carbon target for 2050.

15.4.55 The Climate Change Act 2008 sets the target for UK emissions for 2050, and carbon budgets have been developed by the CCC for four-year periods from 2008, and most recently for 2033-2037 (the Sixth Carbon Budget). This is set at 965 megatonnes[10] of carbon dioxide equivalent ($MtCO_2e$) for 2033-2037, and for the first time this budget includes emissions from international shipping and international aviation.

15.4.56 As noted in the summary of the Airports NPS, one measure of significance of emissions is based on whether they materially impact on the ability of Government to meet carbon reduction targets.

15.4.57 The Appraisal of Sustainability for the Airports NPS is based on an appropriate planning assumption for CO_2 emissions from domestic and international aviation in 2050 of 37.5 $MtCO_2$, as recommended by the CCC. Reporting of aviation emissions in units of CO_2 (rather than CO_2e as for other emissions) is in line with guidance from the CCC.

[10] A megatonne (Mt) is equivalent to 1,000,000 metric tonnes

15.4.58 The Sixth Carbon Budget (CCC, 2020) does not provide a budget recommendation for aviation but does set out a range of scenarios for future aviation which adopt different modelling assumptions on aviation growth, engine efficiencies, and use of alternative fuels. Outturn emissions from aviation in 2050 vary widely across these scenarios[11]. The PEIR does not fully explore the range of potential scenarios out to 2050, and the relative impacts of different measures to decarbonise aircraft emissions. These will be further explored in the ES in view of the Jet Zero consultation and the next steps arising from it.

15.4.59 Emissions calculations within this PEIR have been quantified in line with the Airports NPS guidance/categorisation. Following this guidance, the emissions are quantified as domestic or international, and categorised as traded or non-traded emissions (under the UK ETS).

15.4.60 A conservative approach has been taken through the GHG assessment to avoid under-estimating impact, and the quantification of GHG emissions represents a reasonable worst-case assessment. The quantification does not reflect fully the potential decarbonisation mechanisms included in current consultation on achieving Net Zero in the aviation sector. Given that all GHG emissions are considered significant in this assessment (in line with IEMA guidance) the predicted effect has been quantified and put into context against the future baseline scenario, and against national carbon budgets.

15.5. Assumptions and Limitations of the Assessment

Climate Change Resilience and In-combination Climate Change Impacts Assessments

15.5.1 All climate change projections are subject to uncertainties, due to the complexity of the climate system, natural climate variability, uncertainty over future greenhouse gas emission levels and modelling uncertainties.

15.5.2 In order to address uncertainty in model projections, UKCP18 provides probabilistic projections for some climate variables, that is, likelihoods are assigned to different levels of change. The existence of probabilistic projections and available information can be used to provide an estimate of the level of confidence for the magnitude and direction of changes in climate. Probabilistic projections, however, are not available for all relevant climate variables, particularly those relating to extreme climate events. Information regarding extremes can be obtained from a set of Regional Climate Model projections, although these data only go up to 2079.

15.5.3 Information on climate change effects on lightning and fog is not currently available in UKCP18 (Met Office, 2018a). The information available from UKCP09 (Met Office, 2009) has therefore been used in this PEIR. If updated information on projections of parameters for lightning and fog become available at a later date, these will be considered in the ES.

15.5.4 Assessments made in relation to ‘consequence’ and ‘likelihood’ have relied on professional judgement and evidence gathered through other environmental discipline assessments. Initial environmental mitigation measures have been presented in the assessment below. These mitigation measures will continue to be developed further, and will be described in more detail in

[11] The Jet Zero consultation also includes a range of potential emissions scenarios for aviation which represent additional modelling from UK Government, and which include potential trajectories reflecting technology improvements and SAF uptake.

the ES. This does not affect the robustness of the PEIR assessment, and the mandatory requirements for the assessment in the PEIR have been met.

15.5.5 All existing assets are assumed to be maintained in line with Gatwick's existing Climate Change Adaptation Report (GAL, 2016) and therefore are not assessed here. This report assesses future impacts for new assets only.

GHG Emissions Assessment

15.5.6 The temporal scope of this assessment extends to 2050, and this means that assumptions have been made for activities occurring over the period from baseline (2018) to 2050. These assumptions include emissions factors for the range of GHG emitting activities.

15.5.7 Most future emission factors will be dependent on factors outside of Gatwick's control, for example those affected through UK Government policy and legislation (as set out in Section 15.2). This means that there are inherent uncertainties in the quantification of future GHG emissions.

15.5.8 Table 15.5.1 sets out the main assumptions that have informed the development of the future scenario GHG estimates. Additional details on assumptions within the modelling process are set out in Appendix 15.4.1.

Table 15.5.1: Assumptions within the GHG Assessment

Assessment Issue	Assumptions
Future decarbonisation of the UK national grid	The grid is forecast to reduce in carbon intensity over the period of the Project, meaning that the GHG emissions from electricity use will reduce per kilowatt hour (kWh). The extent and rate at which this will happen is unclear. The assessment has used UK Government forecasts for grid decarbonisation set out in the Green Book supplementary guidance: valuation of energy use and greenhouse gas emissions for appraisal (BEIS, 2020a). This decarbonisation trajectory is set out in Appendix 15.4.1.
Changes to the road vehicle fleet	The road vehicle fleet in the UK is projected to change in terms of the efficiency of vehicles, and also the shift from use of petrol/diesel vehicles to increasing numbers of electric vehicles. The assumed changes in vehicle fleet make-up are presented in Appendix 15.4.1.
Aviation emissions	The assumptions informing fuel use for aircraft in operation until 2038 are as set out in the air quality assessment in Chapter 13[12]. The assessment includes a projection for emissions in the year 2050 based on a small amount of modelled growth between 2039 and 2050. The assessment is cognisant of factors which will affect the efficiency of aircraft in future and assumes industry-wide year-on-year efficiency improvements of 1.4 per cent in line with the CCC 'Balanced Net Zero Pathway' from the 2020 Sixth Carbon Budget (CCC, 2020) for the period 2038-

[12] The assessment out to 2038 has been based on estimates of how the aircraft fleet will transition over time, based on assumptions around airlines' fleet procurement programmes and business models. The 'central case' used in this assessment is based on what is considered today to be the most likely rate of fleet transition. Any implications of a slower transition fleet in this period will be reviewed for the ES.

Assessment Issue	Assumptions
	2050 only. This is provided alongside the forecast emissions without this efficiency assumption to illustrate the scale of such measures. The assessment does not take any account of the uptake of alternative-fuelled aircraft (such as hydrogen, electric, or hybrid aircraft) which are expected to be introduced over time for some domestic and short haul flights. The projected emissions under all scenarios (2018 to 2050) do not include any allowance for use of SAF although these are expected to be in increasing use as part of the sectoral transition to net zero GHG emissions. This is considered to be a conservative approach, and the applicability of different assumptions on future decarbonisation mechanisms will be revisited in the ES.
Sustainable Aviation Fuels (SAF)	The assessment in this PEIR does not consider the use of SAF in any modelled scenarios and as such contributes to a worst-case quantification of aviation emissions in the assessment years. Use of SAF is expected to be a significant element within wider decarbonisation of the aviation sector and will be more fully explored in the ES.
Zero emissions flight technology	The assessment in this PEIR does not consider the development and use of electrical or hydrogen powered aircraft, which are expected to be in operation over the timeframe of the project for some domestic and short haul flights.
Construction materials	In the absence of detailed design quantities for construction projects (which would be developed later) benchmarks for typical materials per m^2 of floor area of building have been used. Further details on these assumptions are set out in Appendix 15.4.1. For this PEIR no assumptions have been made regarding changes to the embodied carbon of construction materials in future years. As the UK progresses towards climate change targets for 2050 these are expected to reduce. This is considered a conservative approach to estimating embodied carbon emissions for construction. A fuller understanding of the construction materials for the Project would be developed, and as part of this an allowance for future embodied carbon reductions will be incorporated for the final ES.
Construction material and waste transportation	Construction waste arises from two main sources: the demolition or removal of existing structures/surfaces, and waste generation from onsite construction activities. In the absence of detailed design quantities benchmarks for typical waste quantities have been used. For this PEIR the estimates of demolition/removal of existing structures/surface assumes no reuse of materials within the Project (although this can be considered a worst case approach to the assessment – further development of the mitigation strategy is likely to lead to some of these emissions being avoided and this will be reported in the ES). Construction waste production from construction processes will be estimates as an additional % tonnage overhead on the construction materials. Further details on these assumptions are set out in Appendix 15.4.1.

Assessment Issue	Assumptions
Construction processes	Construction process emissions arise from the operation of plant and equipment on site. This ranges from large scale plant (eg batching plant for concrete) to operation of individual pieces of machinery. Emissions arise from the energy use which can be powered by a range of sources including grid electricity, local electricity generation, or direct fuel use. Construction emissions have been estimated based on staff numbers for plant operatives, assuming a set number of operating hours per operator and using benchmark energy consumption for a set of indicative plant equipment. For this PEIR no assumptions have been made regarding changes to the carbon intensity of power/fuels used in construction plant. As the UK progresses towards climate change targets for 2050 these are expected to reduce. A fuller understanding of the construction processes and plant usage for the Project will be developed, and as part of this an allowance for future changes to construction plant power/fuel emissions will be incorporated for the final ES.
Surface access for passengers	The quantification of future emissions from surface access has been developed from the 2018 baseline, scaled to reflect changes in passenger numbers but ultimately not reflecting any significant modal shift, and as such is considered a conservative approach. Assumptions have been made on the likely transition to lower emissions vehicles over time. Further details on these assumptions are set out in Appendix 15.4.1.
Surface access for airport staff/workers	The quantification of future emissions from staff travel to/from the airport has been developed from the 2018 baseline, scaled to reflect changes in ATMs, but ultimately not reflecting any significant modal shift, and as such is considered a conservative approach. Assumptions have been made on the likely transition to lower emissions vehicles over time. Further details on these assumptions are set out in Appendix 15.4.1.
Freight transport	Detailed data are unavailable at present on freight transport which comprises several categories of vehicle transport: ▪ freight supporting retail activities; ▪ airline serving freight; ▪ airport service freight; and ▪ cargo/mail freight. Forecasts for the Project provide estimates of cargo/mail freight and at this stage emissions for this component only have been calculated. Other freight (including retail freight) will be included in the final ES. It is currently estimated that non-cargo freight emissions will be approximately equivalent to the calculated cargo freight emissions.
Airport operations	Airport operations incorporates several emissions activities including operational energy use, aviation fuel for firefighting and aircraft engine testing, and water/wastewater/waste emissions. Emissions from the use of aviation fuel (firefighting, engine testing, APUs, other non-aviation uses) have been calculated as set out in the air quality assessment in Chapter 13. Further details on other emissions activities assumptions are set out in Appendix 15.4.1.

15.6. Baseline Environment

Current Baseline Conditions

Climate Change Resilience and In-combination Climate Change Impacts Assessments

15.6.1 Information regarding historical climate conditions at Gatwick Airport was obtained from the UKCP18 observed climate data sets. All the data for the current baseline were obtained from this source.

15.6.2 12 km × 12 km grid resolution was used to obtain observed projections for all climate variables except relative humidity, which was collected from a 25 km × 25 km grid. The grid cell selected to collect the baseline climate data for Gatwick at the 12 km × 12 km grid resolution is presented in Figure 15.6.1 and the 25 km × 25 km grid resolution is presented in Figure 15.6.2.

15.6.3 Seasonal climate averages for Gatwick Airport are given in Table 15.6.1. Information regarding occurrence of extreme weather events, including hot days, frost days, heavy rainfall and dry spells is given in Table 15.6.2. The data are presented as the average increase in number of days per year.

15.6.4 This data was derived by analysis of observed weather timeseries from gridded datasets. The data are considered to be an accurate reflection of climate conditions at the airport as it is in a rural location and is understood not to experience a pronounced local microclimate.

15.6.5 Gatwick is one of three sites in and around London for which design weather data are provided by the CIBSE (2014). This guidance document indicates that Gatwick Airport does not experience a detectable urban heat island effect and the airport has a climate that is characteristic of its rural surroundings.

Table 15.6.1: Seasonal Climate Averages for the Gatwick Area

Parameter	Baseline 1981-2010
Winter mean temperature (°C)	4.6
Summer mean temperature (°C)	16.3
Winter mean daily minimum temperature (°C)	1.4
Summer mean daily maximum temperature (°C)	21.5
Winter mean precipitation rate (mm/day)	2.5
Summer mean precipitation rate (mm/day)	1.7

Table 15.6.2: Historical Extreme Weather Events for the Gatwick Area

Parameter	Baseline 1981-2010
Number of frost days (daily minimum temperature equal or lower than 0°C)	53.6
Heatwaves (two days with maximum temperature higher than 29°C and minimum temperature higher than 15°C)	0.3
Number of hot days (daily maximum temperature higher than 25°C)	17.3
Dry spells (10 days or more with no precipitation)	4.9
Number of days per year when precipitation is greater than 25 mm per day (Met Office definition of 'heavy rain')	1.9
Relative humidity winter (%)	85.7
Relative humidity summer (%)	77.3

GHG Emissions Assessment

15.6.6 The baseline refers to Gatwick's GHG emissions in the calendar year 2018. It draws together information from a range of documents, analyses and sources. A full breakdown of emissions is included in Appendix 15.4.1 to provide estimates of GHG emissions, these are summarised in Table 15.6.3 to Table 15.6.5[13].

Table 15.6.3: 2018 Baseline: Construction, Airport Operation, Surface Access

Emissions Activity	GHG Emissions ($MtCO_2e$)
	2018
Construction	
Construction	Baseline construction emissions for 2018 are considered to be zero for the purposes of the assessment.
Land use change	Land use change emissions (eg from addition/removal of vegetated areas) have not been calculated for this PEIR. These will be incorporated into the final ES. It is not expected that emissions from land use change will materially affect the assessment in this PEIR and its conclusions.
Operation	
Airport operation	0.081
Surface access	0.308

[13] Emissions activities are marked with an alphanumeric superscript to aid in reconciliation with reported totals in subsequent tables.

Table 15.6.4: 2018 Baseline: Aircraft Emissions

Emissions Activity	GHG Emissions ($MtCO_2$)
	2018
UK domestic flights	
LTO	0.027
CCD	0.050
Total	**0.077**
Non-domestic EEA flights	
LTO	0.225
CCD	1.346
Total	**1.571**
Non-EEA International flights	
LTO	0.146
CCD	2.927
Total	**3.073**

Table 15.6.5: 2018 Baseline: Summary

Emissions Totals	GHG Emissions ($MtCO_2e$[14])
	2018
Total excluding international air transport	0.466
Total including international air transport	5.110

15.6.7 Traded sector emissions for 2018 were those which fell under the EU ETS. These include domestic and non-domestic intra-EEU aviation emissions, and also a portion of emissions generated by combustion plant owned and operated by Gatwick Airport Ltd. Emissions under EU ETS consider only CO_2 emissions (not the wider CO_2-equivalent emissions).

Table 15.6.6: 2018 Baseline: Traded Sector Emissions

Emissions Totals	GHG Emissions ($MtCO_2$)
	2018
UK domestic flights [(e)]	0.077
Non-domestic EEA flights [(f)]	1.571
Gatwick Airport Ltd UK ETS emissions	0.010
Total traded sector emissions	**1.658**

[14] Unless explicitly stated all emissions totals are based on CO_2 emissions for aviation aggregated with CO_2e emissions for other activities.

Future Baseline Conditions

Climate Change Resilience and In-combination Climate Change Impacts Assessments

15.6.8 Information regarding future climate has been obtained from the UKCP18 projections (Met Office, 2018a). The GHG emissions scenario considered was RCP8.5[15]. The Airports NPS requires the high emissions scenario to be used. In UKCP09, one emissions scenario was termed 'high'; however, this is not the case in UKCP18, where emissions scenarios are referred to by the RCP value (Met Office, 2009, 2018b). The scenario with the highest level of GHG emissions in UKCP18 is RCP8.5.

15.6.9 Changes in the future values of climate averages were obtained from the probabilistic projections data set on a 25 km × 25 km grid. The nearest grid cell to Gatwick was selected.

15.6.10 Information for other climate variables was obtained from timeseries analysis of the regional land surface projections at 12 km x 12 km resolution. The UKCP18 data at 2.2 km grid resolution has not been used because the increased resolution does not change the outcome of the assessment and therefore the 12 km grid resolution is considered sufficient.

15.6.11 The grid cell selected to collect the future climate data for Gatwick at the two resolutions is presented in Figures 15.6.1 and 15.6.2.

15.6.12 Table 15.6.7 and Table 15.6.8 show the predicted values for seasonal averages of temperature, precipitation and relative humidity in the two future climate periods. The data are presented as the average increase in number of days per year. Note that in the calculation, the variables are treated as being independent. The data indicate that mean temperatures will increase, winter precipitation will increase, and summer precipitation will decrease in comparison with baseline temperatures recorded in Table 15.6.1.

Table 15.6.7: UKCP18 Climate Change Projections for Meteorological Changes for the Gatwick Area

Parameter	2020-2049 (RCP8.5 Percentile)		
	10th	50th	90th
Winter mean temperature (°C)	4.5	5.5	6.6
Summer mean temperature (°C)	16.8	17.7	18.7
Winter mean daily minimum temperature (°C)	1.2	2.3	3.4
Summer mean daily maximum temperature (°C)	22.0	23.1	24.4
Winter mean precipitation rate (mm/day)	2.4	2.7	3.0
Summer mean precipitation rate (mm/day)	1.1	1.5	1.8

[15] Representative Concentration Pathway's (RCP) are used to model future climate and represent a broad range of climate outcomes based on different economic, social and physical assumptions. The RCPs can be represented by the levels of temperature change that result from each scenario. The RCP8.5 scenario represents a pathway where greenhouse gas emissions continue to grow unmitigated, leading to a global average temperature rise of 4.3°C by 2100. This is considered to be the worst case scenario (Met Office, 2018b)

Table 15.6.8: UKCP18 Climate Change Projections for Meteorological Changes for the Gatwick Area

Parameter	2050-2079 (RCP8.5 Percentile)		
	10th	50th	90th
Winter mean temperature (°C)	5.3	6.7	8.3
Summer mean temperature (°C)	17.6	19.7	21.8
Winter mean daily minimum temperature (°C)	2.0	3.6	5.3
Summer mean daily maximum temperature (°C)	22.9	25.4	28.0
Winter mean precipitation rate (mm/day)	2.4	2.9	3.4
Summer mean precipitation rate (mm/day)	0.7	1.2	1.7

15.6.13 Table 15.6.9 and Table 15.6.10 contain projections for extreme weather events, including hot days, cold days, heavy rainfall, dry spells and relative humidity. The data are presented as the average increase in number of days per year.

15.6.14 Table 15.6.10 demonstrates that the frequencies of hot days, dry spells and heavy rainfall will all increase in the future compared to the baseline, whilst the number of cold days will decrease. This suggests hot day temperatures (>25°C) and heavy rainfall will pose an increased risk to Gatwick Airport and cold temperatures will pose a decreased risk, and that the need for de-icing is likely to decrease. Whilst winters are expected to be become warmer on average, cold weather spells will still occur up to and during the middle of this century and are expected to be the same magnitude and intensity as today.

Table 15.6.9: UKCP18 Projections for Future Extreme Weather Events for the Gatwick Area

Parameter	2020-2049		
	RCP8.5 Min	RCP8.5 Mean	RCP8.5 Max
Number of frost days (daily minimum temperature equal or lower than 0°C)	28.8	37.5	49.4
Heatwaves (two days with maximum temperature higher than 29°C and minimum temperature higher than 15°C)	0.2	1.8	4.9
Number of hot days (daily maximum temperature higher than 25°C)	23.2	37.2	61.6
Dry spells (10 days or more with no precipitation)	4.6	5.4	6.7
Number of days per year when precipitation is greater than 25 mm per day (Met Office definition of 'heavy rain')	1.4	2.4	4.3
Relative humidity winter (%)	85.5	85.5	85.5
Relative humidity summer (%)	73.0	73.0	73.0

Table 15.6.10: UKCP18 Projections for Future Extreme Weather Events for the Gatwick Area

Parameter	2050-2079		
	RCP8.5 Min	RCP8.5 Mean	RCP8.5 Max
Number of frost days (daily minimum temperature equal or lower than 0°C)	20.5	25.2	31.2
Heatwaves (two days with maximum temperature higher than 29°C and minimum temperature higher than 15°C)	2.9	8.0	14.9
Number of hot days (daily maximum temperature higher than 25°C)	43.2	69.0	92.8
Dry spells (10 days or more with no precipitation)	5.4	6.6	7.8
Number of days per year when precipitation is greater than 25 mm per day (Met Office definition of 'heavy rain')	1.6	3.1	4.7
Relative humidity winter (%)	85.1	85.1	85.1
Relative humidity summer (%)	69.0	69.0	69.0

15.6.15 Gatwick has its own Airside Operations Adverse Weather Plan which includes all airside operations areas and details how stable operations are sustained in the event of an adverse weather event.

GHG Emissions Assessment

15.6.16 The future baseline includes the increased passenger numbers and ATMs in the absence of the Project. The full future baseline is set out in Appendix 15.4.1.

Operational Emissions

15.6.17 Future baseline emissions for 2029 and 2038, reflecting the opening year of the Project and design year, are set out in Tables 15.6.11 and 15.6.12 below. The methodology and assumptions included in the calculation of these are set out in Appendix 15.4.1.

Table 15.6.11: Future Baseline: Construction, Airport Operation, Surface Access (Opening/Design Years)

Emissions Activity	Opening Year Emissions ($MtCO_2e$)	Design Year Emissions ($MtCO_2e$)
	2029	**2038**
Construction		
Construction	No construction is scheduled for the future baseline year 2029.	No construction is scheduled for the future baseline year 2038.
Land use change	Land use change emissions (eg from addition/removal of vegetated areas) have not been calculated for this PEIR. These will be incorporated into the final ES.	
Operation		
Airport operation	0.071	0.061
Surface access	0.368	0.382

15.6.18 Future baseline emissions from aviation are based on:

- recorded flights in 2018; and
- forecast flight details (based on passenger and ATM forecasts) for 2029, 2032 and 2038; further details of the methodology and assumptions are set out in Appendix 15.4.1.

15.6.19 The baseline aircraft emissions are forecast to increase out to 2038, increasing to approximately 321,000 ATMs, leading to higher overall GHG emissions. The projected emissions from aircraft for the future baseline consider the forecast flight destinations and aircraft types. They also reflect changes in the expected aircraft fleet in the period to 2038. The projected emissions do not include any consideration of SAF within the operation of aircraft, or other improvements such as uptake of electrical or hydrogen powered aircraft, which are expected to be in operation over the timeframe of the project for some domestic and short haul flights.

Table 15.6.12: Future Baseline: Aircraft Emissions (Opening/Design years)

Emissions Activity	Opening Year Emissions ($MtCO_2e$)	Design Year Emissions ($MtCO_2e$)
	2029	**2038**
UK domestic flights		
LTO	0.024	0.023
CCD	0.047	0.045
Total	**0.070***	**0.068**
Non-domestic EEA flights		
LTO	0.244	0.235
CCD	1.510	1.529
Total	**1.754**	**1.764**

Emissions Activity	Opening Year Emissions ($MtCO_2e$)	Design Year Emissions ($MtCO_2e$)
	2029	**2038**
Non-EEA International flights		
LTO	0.159	0.147
CCD	3.575	3.767
Total	**3.734**	**3.914**

* Values do not sum due to rounding

15.6.20 A summary of the overall baseline emissions is presented in Table 15.6.13.

Table 15.6.13: Future Baseline: Summary (Opening/Design Years)

Emissions Totals	Opening Year Emissions ($MtCO_2e$)	Design Year Emissions ($MtCO_2e$)
	2029	**2038**
Total excluding international air transport	0.509	0.511
Total including international air transport	5.997	6.189

15.6.21 The future baseline traded emissions sector emissions are presented in Table 15.6.14 Traded sector emissions are those which fall under the scope of the UK ETS. These include domestic and non-domestic intra-EEU aviation emissions, and also a portion of emissions generated by combustion plant owned and operated by Gatwick Airport Ltd. Emissions under EU ETS consider only CO_2 emissions (not the wider CO_2-equivalent emissions).

Table 15.6.14: Future Baseline: Traded sector emissions (Opening/Design Years)

Emissions Totals	Opening Year GHG Emissions ($MtCO_2$)	Design Year GHG Emissions ($MtCO_2$)
	2029	**2038**
UK domestic flights [e]	0.070	0.068
Non-domestic EEA flights [f]	1.754	1.764
Gatwick Airport Ltd UK ETS emissions	0.010	0.011
Total traded sector emissions	**1.834**	**1.843**

15.7. Key Project Parameters

15.7.1 The assessment has been based on the parameters identified within Chapter 5: Project Description.

15.7.2 Table 15.7.1 and Table 15.7.2 below identify the key parameters relevant to this assessment. Where options exist, the maximum design scenario selected is the one having the potential to result in the greatest effect on an identified receptor or receptor group. Effects of greater adverse significance are not predicted to arise should any other option identified in Chapter 5: Project Description be taken forward in the final design of the Project.

Climate Change Resilience and In-combination Climate Change Impacts Assessments

15.7.3 The RCP8.5 UKCP18 emissions scenario (Met Office, 2018a) (the 'high' emissions scenario) has been used to assess climate change effects, as it represents the maximum level of climate change in UKCP18.

Table 15.7.1: Maximum Design Scenarios

Potential Impact	Maximum Design Scenario	Justification
Construction Phase for ICCI and CCR: 2024-2037		
Climate change impacts to all receptors and asset groups identified by the topic chapters and set out in Chapter 5: Project Description respectively.	Construction activities would be phased over a period of 14 years, and therefore the 2020-2049 time period for a RCP8.5 scenario has been used.	The assessment year used for each receptor or asset group represents the maximum level of climate change in UKCP18 for this time period.
Operation Phase: Design Year for ICCI and CCR: 2038		
Climate change impacts to all receptors identified by the topic chapters and all asset groups identified by the Project Description in Chapter 5.	For the receptors identified by the topic chapters and all asset groups identified in the Project Description, the climate change projections for the 2050-2079 ('2060s') Future Climate Scenario have been used to represent climate changes up to a future Design Year of 2080.	For the ICCI assessment, climate change projections for this time period have been used to represent the maximum level of climate change (using UKCP18 projections) for all topic receptors. For the CCR assessment, climate change projections for this time period have been used in view of the requirement of the NPS for National Networks to consider climate changes out to 2080 where infrastructure has a design life of 60 years or more and has safety critical elements (both conditions have been assumed to apply). It has not been possible to consider climate projections beyond 2079 because the projected extreme weather data sets in UKCP18 only extend to 2079 and these data sets are considered the most appropriate for assessing CCR issues.

GHG Emissions Assessment

15.7.4 The impact being assessed is the emission of GHGs arising from the construction of the Project and the operation of the airport in future years. The impact (ie the emissions) arises from a consistent set of sources, albeit the emissions from each source will vary during the period between 2022 and 2038.

Table 15.7.2: Maximum Design Scenarios

Emissions Activity	Maximum Design Parameters
Construction	Construction of all components of the Project Description delivered in line with the indicative phasing.
Air transport	Maximum passenger throughput of approximately 80.2 million passengers per annum (mppa) by 2047, and 389,000 total aircraft movements per annum by 2047.
Surface access	Surface access for maximum 75.6 mppa by 2038 travelling by the same transport modes/distances as for 2018 baseline. Staff access for maximum 32,000 staff travelling by the same transport modes/distances as for 2018 baseline.
Operation of the airport, building and facilities	Energy use to support 75.6 mppa by 2038 equating to consumption of up to 280 million kWh from gas, electricity and fuels. Increased energy, water, wastewater, and waste generation and management to support 75.6 mppa by 2038.

15.8. Mitigation and Enhancement Measures Adopted as Part of the Project

Climate Change Resilience Assessment

15.8.1 Gatwick has policies and procedures in place to minimise the impacts of extreme weather events. These are listed in Table 15.8.1. Any mitigation determined to be subsequently required following preparation of the ES will be listed. No monitoring or enhancement has been identified at this stage; it will be updated as part of the ES.

Table 15.8.1: Mitigation and Enhancement Measures for Climate Change Resilience Assessment

Measures Adopted as Part of the Project	Reason
Mitigation	
Gatwick Adverse Weather Plan: includes all airside operations areas and how they can sustain stable operations in the event of an adverse weather event.	This plan achieves resilience by setting out processes and procedures for different extreme weather events.
Sustainability Statement.	The Sustainability Statement for the Project is currently being developed and will inform the ES. It will include measures to address climate change adaptation and resilience.
Code of Construction Practice (CoCP).	The CoCP will set out best practice construction methods to mitigate potential in-combination climate change impacts from climate change on groundwater receptors (Chapter 10: Ground Conditions).

In-combination Climate Change Impacts Assessment

15.8.2 Mitigation and enhancement measures identified by other environmental disciplines and how they influence the ICCI assessment are presented in Table 15.8.2 below.

Table 15.8.2: Mitigation and Enhancement Measures for In-combination Climate Change Impacts Assessment

Measures Adopted as Part of the Project	Reason
Mitigation	
Code of Construction Practice (CoCP).	The CoCP will set out best practice construction methods to mitigate potential in-combination climate change impacts from climate change on groundwater receptors (Chapter 10: Ground Conditions).
Development of a Vegetation Retention Strategy (See Section 8.8 of Chapter 8: Landscape, Townscape and Visual)	To ensure green infrastructure assets are retained wherever possible and impacts of the character of surrounding landscapes and townscapes are minimised.
Planting woodland, tree, scrub, shrub, wetland, amenity and grassland planting (See Section 8.8 of Chapter 8: Landscape, Townscape and Visual)	Planting proposals will ensure a high-quality environment is created. These proposals will include consideration of climate change by including drought resistant species into the matric planting options and increase resilience of plants to future drought conditions. This will benefit several environmental topics; Chapter 7: Historic Environment, Chapter 8: Landscape, Townscape and Visual, Chapter 9: Ecology and Nature Conservation, Chapter 16: Socioeconomics.
Preparation of a Landscape and Environmental Management Plan (LEMP)	Build long term climate resilient mitigation into the landscape surrounding Gatwick. Further details to be provided in the ES.

Measures Adopted as Part of the Project	Reason
Creation of new high value habitats (ie wet and dry neutral grasslands and neutral and marshy grassland). Along with creation of new habitat within the newly created mitigation area west of the Project site.	To provide new habitats for fauna displaced during the diversion of the River Mole, enhancing existing habitats and increasing the resilience of flora subject to increased drought conditions in future.
Creation of a new pond designed to provide a high value habitat for aquatic flora, invertebrates and amphibians within a mitigation area.	To provide habitats of conservation interest and also to increase resilience of fauna to possible drought conditions in future.
Implementation of measures to prevent and control spillage of oil, chemicals and other potentially harmful liquids. This would ensure appropriate storage and handling of materials and products in accordance with the Control of Pollution (Oil Storage) (England) Regulations 2001	Chapter 10: Ground Conditions recommend the implementation of measures to ensure appropriate storage and handling of materials and products that reduce the impact of accidental spillages and potential impacts from simultaneous flooding events. This will be captured in the CoCP.
Appropriate design of newly installed infrastructure in line with relevant UK and European standards.	To minimise the impact from aggressive ground conditions, damaging newly installed infrastructure, which could also be worsened by flood events. Further details on the design of these assets will be provided in the ES.
Realignment of the River Mole	To create a more natural plan form and improve flow regime increasing the existing capacity of the river (Chapter 11: Water Environment). This mitigation will also increase the resilience of the surrounding area to changing climate and provide additional habitats (Chapter 9: Ecology and Nature Conservation).
Relocation and reconfiguration of Pond A and creation of smaller flood water storage areas included across Catchment A	Chapter 11: Water Environment proposes replacing floodplain, lost from construction of new taxiways, as part of the Project. This will accommodate increased runoff, thus reducing flood risk at the site.
Provision of compensatory flood storage areas at Museum Field, existing Car Park X and East of Gatwick Stream.	To replace lost floodplain storage during construction and reduce flood risk in future.
Surface access arrangement drainage strategy and provision of new airfield syphons	The strategy to include new impermeable areas (road and airfield infrastructure) will reduce additional surface water runoff, thus increasing resilience to extreme weather events in future (Chapter 11: Water Environment, and Chapter 12: Traffic and Transport).
Highway improvement scheme	The design of the highway improvement scheme (Chapter 12: Traffic and Transport) will be developed in line with Environment Agency climate change allowances and account for future climate change.
Construction Traffic Management Plan	To minimise any negative environmental and community impacts including the impacts of extreme weather events.

Measures Adopted as Part of the Project	Reason
Noise Insulation Scheme	This voluntary scheme for qualifying buildings will offer acoustic and ventilation measures to reduce noise impacts. It may also reduce overheating risk to households that sign up to the scheme. See Chapter 14: Noise and Vibration for further details
Soil Management Strategy (Chapter 18: Agriculture and Recreation)	To ensure no additional negative impacts from climate change, by conserving soil resources, avoiding damage to soil structures, maintaining soil drainage and reinstating soil profiles during construction.
Re-provision of existing public open spaces	The newly designed public space is likely to enhance existing conditions; thus reducing negative effects of extreme events on public behavior and patterns of use place (Chapter 16: Socio-economics).
Monitoring	
Monitoring included in environmental topic chapters of this PEIR	Chapter 9: Ecology and Nature Conservation recommends continual monitoring of species assemblages under changing climate conditions, particularly non-native species, and the condition of water bodies providing wetland habitats. Chapter 11: Water Environment states that Gatwick will continue to monitor the quality of water discharge to ensure that any changing rainfall patterns do not impact the water quality given the increased de-icer loading. Whilst winters are expected to be become warmer on average, cold weather spells will still occur up to and during the middle of this century and are expected to be the same magnitude and intensity as today.
Enhancement	
Management of, or implementation of, proposed mitigation to enhance existing green infrastructure including hedgerows, woodland, trees, shrubs, wetland and amenity planting	To enhance the character and biodiversity of the airport and surrounding landscape/townscape. Enhancement of existing green infrastructure including hedgerows, woodland, trees, shrubs, wetland and amenity planting will also increase the resilience of landscape receptors to changes in future climate.

GHG Emissions Assessment

15.8.3 The Project would incorporate many embedded environmental design measures that would be expected to contribute positively to mitigation of the GHG emissions associated with the Project. The extent of such mitigation activities is not yet confirmed, and the impact of these on GHGs has not been calculated within this PEIR but will be included in the ES as part of the application once their detail has been confirmed. Mitigation measures expected for inclusion in the final ES are set out in Table 15.8.3.

15.8.4 The majority of mitigation opportunities through both construction and operation will be reflected in the Carbon and Climate Change Action Plan currently in development, and which it is intended

will be submitted as part of the application for development consent along with the final ES, alongside the Energy Strategy and the Surface Access Strategy.

Table 15.8.3: Mitigation and Enhancement Measures (GHG Emissions)

Measures to be Adopted as Part of the Project for the ES	Reason
Mitigation	
Life cycle considerations in design	Early consideration of design strategies for buildings and infrastructure offer the greatest opportunity to reduce carbon during the full life cycle of the Project. The PEIR has quantified GHG emissions based on typical industry benchmarks for material quantities, constituent materials, and recycled content. Opportunities for material selection, sourcing and design optimisation will be identified during subsequent design stages. The opportunities to identify and implement GHG reductions in construction design and material will be delivered through the Carbon and Climate Change Action Plan.
Low carbon design and performance standards	Low and zero carbon design and performance standards will be applied to new infrastructure, including how renewable energy infrastructure will be incorporated into future designs.
Construction Logistics	Reducing the use of road vehicles for delivery of bulk materials to the Project site, and optimisation of transportation distances, are environmental mitigation measures that provides benefits to several environmental disciplines. The PEIR has typical delivery and construction logistics profiles for the assessment as set out in Appendix 15.4.1. This assumption will be reviewed and if necessary, modelling will be updated should this change in advance of the full ES.
Earthworks Strategy	The earthworks strategy seeks to deliver the optimum balance between cut (excavated) material and fill material. This provides benefits to several environmental disciplines in addition to GHG emissions by reducing transport of waste materials. However, the current GHG assessment for this PEIR has assumed a situation whereby there is inadequate space to store excavated material locally for reuse on the Project, instead assuming that it is all transported off site for disposal. In addition, it is assumed (for this PEIR) that all fill materials are sourced from outside the Project boundary. These assumptions will be reassessed in the ES based on the earthworks' strategy at that point in time. However, these assumptions represent a 'worse case' assessment than the final developed earthworks strategy which will reuse/recycle some cut material.
Construction Plant Usage	The PEIR assessment currently assumes all construction plant is diesel powered and of typical efficiency. On site emissions would be reduced through use of more efficient construction plant and low / zero emission construction plant. Where appropriate grid electricity would be used to power construction

Measures to be Adopted as Part of the Project for the ES	Reason
	plant (where this offers a carbon benefit without compromising other environmental priorities).
Material Selection	The PEIR assumes typical carbon intensity for materials as set out in Appendix 15.4.1. In addition to optimising the cut/fill balance across the Project site boundary, the use of lower impact construction products would be considered alongside environmental impacts across the full life cycle to reduce maintenance/replacement frequency. Opportunities for local sourcing of materials will also be sought to minimise transport impacts.
Aircraft Emissions	Gatwick would provide FEGP for most parked aircraft to minimise the need for use of APUs. In addition Gatwick will seek to achieve other opportunities to reduce fuel use in aircraft on the ground including reduced taxiing (to reduce air conditioning use in aircraft), promotion of single-engine taxiing, and working with airlines to reduce waiting times at the runway holds. Gatwick will also seek to integrate infrastructure to support the transition of airlines to alternative aviation technologies including (where appropriate) for electric aircraft and hydrogen aircraft.
Highway Capacity	Improvements to the highways network around the airport are being made as part of the Project, including a new junction with full grade separation for South Terminal access, a new grade-separated junction for North Terminal to remove A23 westbound traffic from the North Terminal roundabout, and works to the Longbridge roundabout. These improvements would reduce the risk of increased congestion (and associated emissions) arising from increased vehicles.
Surface Access	The PEIR has estimated surface access impacts based on passenger and staff numbers, typical transport distance, and historic modal split. No modal shift has been modelled within the PEIR. It is expected that a range of measures will be implemented to reduce the impacts arising from surface access to the airport by passengers and staff by (for example) increasing the number of passengers arriving by public transport, and encouraging other lower carbon modes of transport for those accessing the airport.
Airport Operations	Gatwick is developing an Energy Strategy to support ongoing reductions in Scope 1 and 2 emissions for airport operations, including the power and energy used on site for buildings (improved performance from building fabric, low energy equipment, and use of on-site renewable energy sources) and operational vehicle fleets and equipment (through efficiency and alternative power sources). Further investment is also planned in directly connected renewable energy supply to the airport.
Airside Operations	Gatwick will continue to implement measures to reduce aircraft emissions on the ground through reduced taxiing and reduced APU use. In the longer-term Gatwick will continue to implement enabling infrastructure for airlines to operate electric and alternative fuelled aircraft and the power and distribution

Measures to be Adopted as Part of the Project for the ES	Reason
	systems to support electric vehicles and ground support equipment, including hydrogen and electric charging systems.
Monitoring	
Emissions Monitoring and Reporting	The airport will continue to carry out annual monitoring and reporting of carbon emissions as total emissions and per passenger, to monitor emissions from the operation of the airport. The monitoring regime for emissions will be set out in the draft Carbon and Climate Change Action Plan to be included within the final ES.
Enhancement	
None at present	At present no enhancement opportunities have been confirmed. In the context of GHG emissions, enhancement would be considered as any measure which would result in the sequestration of carbon (inside or outside the site). There may be potential for enhancement through on site landscaping or off site planting. These are yet to be confirmed for the Project and would be set out in the Carbon and Climate Change Action Plan to be included in the final ES.

15.9. Assessment of Effects

Climate Change Resilience

15.9.1 The full CCR assessment for the construction and operational phases has been presented in Appendix 15.9.1.

Initial Construction Phase: 2024-2029

15.9.2 A summary of the CCR assessment is presented in Table 15.9.1 below.

Table 15.9.1: CCR Assessment for the Construction Phase

Climate Change Hazard	Asset Group	Climate Change Impact	Risk
Increased number of extremely hot days	Temporary buildings for construction workers and site offices	Increased risk of overheating in temporary building accommodation for construction workers likely to have negative impacts on working conditions during construction of the Project.	High
Climate changes in 2020-2039 time period and increased probability of extreme weather events	Construction processes	Disruption or hinderance of construction processes.	High

Further Mitigation

15.9.3 To minimise the impacts of heat stress on construction workers during the construction phase, it is recommended that cooling and ventilation systems are included in the design of temporary office buildings that are sufficient to deal with projected climate changes over this period, by using the appropriate guidance from the CIBSE. This would be sufficient to mitigate against the climate conditions projected for the construction period.

15.9.4 To minimise disruption or hindrance to construction processes, existing mitigation measures, as set out in the CoCP may need to be enhanced to deal with future climate change impacts. Further mitigation may be proposed, if considered necessary, following any scheme refinements and further assessment as part of the ES.

15.9.5 Climate change projections should also be considered in the Code of Construction Practice (CoCP) and any contractor risk assessments developed as part of the construction phase.

Future Monitoring

15.9.6 Monitoring of thermal conditions in temporary buildings associated with the construction activities is likely to be sufficient to assess the efficiency of cooling and ventilation systems in temporary buildings when in operation.

Operation

15.9.7 The preliminary CCR assessment for the operational period has been presented in Table 15.9.2. The risk classification (column 4 of the table below) is a function of likelihood and consequence as illustrated in Table 15.4.7.

Table 15.9.2: CCR Assessment for the Operational Phase

Climate change Hazard	Asset Group	Climate Change Impact	Risk
Increased number of extremely hot days	Airport Operation	Overheating in terminal buildings, hotels, and other buildings leading to thermal discomfort and heat stress for passengers and staff during the operation of the airport that could lead to negative health implications, and negative customer experience.	High
	Airport infrastructure	Changes to takeoff procedures (eg rescheduling flights to take off during cooler times of the day, increasing weight restrictions on flights) or increasing the length of the runway to enable flights to take off under hotter temperature conditions. More information is required to understand the nature of resilience measures better. This impact will be reviewed and developed as part of the next Phase and reported on in the ES.	Medium/ High

Climate change Hazard	Asset Group	Climate Change Impact	Risk
	Electronic Equipment	Sensitive electronic equipment and mechanical operating mechanisms may fail to operate correctly due to high temperatures.	Medium
	Flights	Flashpoint of aviation fuel exceeded on hot days, leading to delays in re-fuelling procedures.	Low
		Possible increase in occurrence of days outside the acceptable range of temperatures affecting aircraft and their utilisation schedule, due to air density changes affecting maximum take-off weight capacity.	Medium
Extreme cold weather	Electronic Equipment	Sensitive electronic equipment and mechanical operating mechanisms may fail to operate correctly due to low temperatures or freezing.	Medium
	Airport Infrastructure	Reliability of journeys may reduce at low temperatures due to cracking of pavement surfaces and snow/ice accretion on aircraft and runways/airfield pavements causing delays.	Medium
	Airport Operation	Possible negative health implications for passengers and staff, disruption to service operation.	Low
	Airport Infrastructure	Possible increase in number of days outside the normally acceptable range of conditions for heating systems and increased risk of heating, ventilation and air conditioning failure.	Very low
Increased frequency of flooding from river, surface and groundwater sources	Airport Infrastructure	Flooding of infrastructure during operation: inundation of airfield, airport building basements and sub-structures, utility cables/tunnels.	Medium
		Flooding of road infrastructure connecting to the airport during operation: inundation of access roads and railways. Effects of infrastructure interdependencies.	Medium
	Airport Operation	Flooding of electrical equipment and mechanical operating mechanisms.	Medium
Increased risk of drought	Landscaping	Increased drought stress to plants/landscaped areas.	Medium
	Airport Operation	Increased water stress for new buildings (Hotel and office space).	Very high
Extreme wind speeds	Airport Infrastructure	Possible debris on runways and other airport infrastructure causing delays (foreign object debris).	Medium
		Tree fall due to strong winds leading to road and rail disruption.	Medium
		Failure or damage to parts of structure or infrastructure as a result of changes in strong winds and gustiness.	Medium
	Flights	Aircrafts not permitted to take off or land causing delays.	Medium

Climate change Hazard	Asset Group	Climate Change Impact	Risk
Increased risk of lightning strikes.	Airport Infrastructure	Indirect and direct damage to buildings, infrastructure, aircraft, equipment from lightning strikes.	Low
	Flights	Suspension of activities on the ramp by ground handling agents, delaying the service and turnaround times for aircraft and stressing terminal/gatehouses.	Low

Further Mitigation

15.9.8 Two climate change impacts have been determined as high or very high risk, which combines likelihood and consequence (see Table 15.4.7). One climate change impact has been determined as medium to high. Recommended mitigation measures to moderate those risks are described below.

15.9.9 Embedded mitigation for increased risk of overheating in terminal buildings, hotels, and other buildings has not yet been determined. It is likely that mitigation measures would be implemented to account for current day overheating in buildings. It is recommended that cooling and ventilation systems are included in the design of terminal buildings, hotels and other buildings that are sufficient to deal with projected climate changes over the operational period of the Project, using appropriate guidance from CIBSE. Further mitigation may be proposed, if considered necessary, following detailed design, to ensure climate impacts and climate change in future are embedded into the design.

15.9.10 Increased water stress for proposed buildings (hotel and office space) has been assessed to be high. The frequency of drought is likely to increase in future and therefore design of proposed buildings will consider the impact of increased water stress over the lifetime of the Project. Water stress mitigation measures will be considered as part of the next phase of design and assessed as part of the ES.

Future Monitoring

15.9.11 No future monitoring has been identified as being necessary at this stage. Monitoring may be proposed, if considered necessary, following any Project refinements and further assessment as part of the ES.

In-combination Climate Change Impacts

Construction

15.9.12 Initial consultations have been carried out with authors of the topic chapters to identify potential in-combination climate change impacts. Progress towards the assessment of these impacts for the construction phase is presented in Appendix 15.9.2 and a summary is provided below.

15.9.13 Phase 1 identified all potential ICCIs and assessed their likelihood. Only ICCIs considered likely were carried forward to Phase 2 and presented in Appendix 15.9.2, where the consequence and significance of the ICCI was assessed.

15.9.14 The initial in-combination climate change impacts assessment indicates that no significant impacts have been identified during the construction phase given the mitigation identified above has been embedded into the Project. The assessment will be reviewed during the next phase of development of the Project design and appropriate further mitigation will be developed, if required, and reported on in the ES.

Further Mitigation

15.9.15 Based on the initial assessment of in-combination climate change impacts, no additional mitigation has been identified in this PEIR for the construction phase.

Further Monitoring

15.9.16 No future monitoring has been identified as being necessary at this stage. Monitoring may be proposed, if considered necessary, following any scheme refinements and further assessment as part of the ES.

Operation

15.9.17 The assessment of potential in-combination climate change impacts for the operational phase is presented in Appendix 15.9.2 and summarised below.

15.9.18 The initial ICCI assessment indicates that there are no significant ICCI identified during the operation of the development based on current understanding. The assessment will be reviewed during the next phase of development of the project design and appropriate further mitigation will be developed, if required, and reported on in the ES.

Further Mitigation

15.9.19 Based on the initial assessment of in-combination climate change impacts, no additional mitigation has been identified in this PEIR for the operational phase.

Further Monitoring

15.9.20 No future monitoring has been identified as being necessary at this stage. Monitoring may be proposed, if considered necessary, following any scheme refinements and further assessment as part of the ES.

GHG Emissions during Construction of the Project

15.9.21 Construction of the airport facilities, and changes to the supporting highway network, would result in GHG emissions as shown in Table 15.9.3. This shows emissions from planned construction irrespective of the Project, the total emissions arising from the works brought forward as part of the Project, and the aggregated total of both over the period 2021-2038. These impacts would include the production of GHGs arising from:

- the extraction, processing and manufacturing of construction materials;
- transportation of construction materials;
- energy and fuel use in construction activities;
- transport and disposal of construction waste; and
- surface access by construction staff.

15.9.22 The Project construction is projected to finish in 2038.

15.9.23 The aggregated estimated emission from construction of the Project between 2023 and 2038 would be 1.610 $MtCO_2e$[16]. This excludes prior planned construction in the period 2021 to 2024 totalling 0.101 $MtCO_2e$. A full breakdown of emissions is presented in Appendix 15.4.1.

15.9.24 In line with IEMA guidance (IEMA, 2017) the increases in emissions over the baseline (in individual years, and in aggregate) are considered significant due to the permanent, cumulative nature of GHG emissions.

Table 15.9.3: Assessment of Construction Effects

Emissions Activity	Total construction emissions (Baseline) ($MtCO_2$)	Total construction emissions (the Project) ($MtCO_2$)	Aggregated construction emissions ($MtCO_2$)
Construction emissions	0.101	1.610	1.711

Contextualising the Emissions

15.9.25 The emissions from construction are set out against the UK carbon budgets as shown in Table 15.9.4.

Table 15.9.4: Construction Emissions Comparison with UK Carbon Budgets

Carbon Budget	Period	Five Year Carbon Budget ($MtCO_2e$)	Total Forecast Construction Emissions from the Project in the Five Year Period ($MtCO_2e$) [17]	Contribution to Carbon Budget
3rd Carbon Budget	2018 to 2022	2,544	0.00018	<0.01%
4th Carbon Budget	2023 – 2027	1,950	0.765	0.04%
5th Carbon Budget	2028 – 2032	1,725	0.738	0.04%
6th Carbon Budget	2033 – 2037	965	0.107	0.01%

Further Mitigation

15.9.26 No further mitigation is expected beyond the activities set out in Section 15.8.

Future Monitoring

15.9.27 No further monitoring is expected beyond the activities set out in Section 15.8.

[16] Land use change emissions (eg from addition/removal of vegetated areas) have not been calculated for this PEIR. These will be incorporated into the final ES.
[17] Construction emissions in this period are associated with planned construction activities in the Project only. With the inclusion of baseline construction emissions in 2018-22 are 0.083 $MtCO_2e$, and in 2023-27 are 0.784 $MtCO_2e$.
[18] Construction emissions in this period are very small but non-zero.

GHG Emissions during Operation of the Project (2029)

Operational Emissions

15.9.28 GHG operational emissions for the first full year of opening in 2029 are presented in Table 15.9.5 below. A full breakdown is provided in Appendix 15.4.1. These operational emissions incorporate both baseline emissions and additional emissions that would occur as a result of the Project, so as to represent the total emissions for Gatwick with the Project in 2029. The aviation emissions reflect changes in the expected aircraft fleet in the period to 2029. The projected emissions do not include any consideration of sustainable aviation fuel (SAF) within the operation of aircraft, or other improvements such as uptake of electrical or hydrogen powered aircraft.

Table 15.9.5: Operational Emissions Assessment for 2029

Emissions activity	Opening year ($MtCO_2$)
	2029
Airport operation	**0.066**
Surface Access	**0.393**
UK domestic flights	
LTO	0.024
CCD	0.049
Total	**0.074***
Non-domestic EEA flights	
LTO	0.254
CCD	1.599
Total	**1.854***
Non-EEA International flights	
LTO	0.169
CCD	3.884
Total	**4.053**
TOTAL	**6.440**

* Table values do not sum due to rounding

Total GHG Emissions for the Project (2029)

15.9.29 The emissions summary for the opening year 2029 includes operational emissions and construction emissions and is presented in Table 15.9.6.

Table 15.9.6: Emissions Assessment Summary for 2029

Emissions Totals	Opening Year ($MtCO_2$)
	2029
Construction emissions for the Project	**0.076**
Total operational emissions excluding international air transport	**0.533**
Total operational emissions from international air transport	**5.907**
Total including international air transport	**6.516**

15.9.30 The opening year 2029 traded emissions sector emissions are presented in Table 15.9.8. Traded sector emissions are those which fall under the UK ETS. These include domestic and non-domestic intra-EEU aviation emissions, and also a portion of emissions generated by combustion plant owned and operated by Gatwick Airport Ltd. Emissions under EU ETS consider only CO_2 emissions (not the wider CO_2-equivalent emissions).

Table 15.9.7: Opening Year (2029): Traded Sector Emissions

Emissions Totals	Opening Year GHG Emissions ($MtCO_2$)
UK domestic flights [e]	0.074
Non-domestic EEA flights [f]	1.854
Gatwick Airport Ltd UK ETS emissions	0.004
Total traded sector emissions	1.931*

* Table values do not sum due to rounding

Comparison with Baseline

15.9.31 The emissions for 2029, in total, are 0.519 $MtCO_2e$ above the 2029 baseline assessment. Of this increase:

- construction emissions in 2029 are predicted to increase from the baseline of zero to 0.076 $MtCO_2e$;
- airport operation emissions in 2029 are predicted to reduce from the baseline of 0.071 $MtCO_2e$ to 0.066 $MtCO_2e$ reflecting the greater opportunity for delivery of lower carbon energy systems arising under the Project scenario;
- surface access emissions in 2029 are predicted to increase from the baseline of 0.368 $MtCO_2e$ to 0.393 $MtCO_2e$;
- aviation emissions in 2029 are predicted to increase from the baseline of 5.558 $MtCO_2$ to 5.981 $MtCO_2$; and
- traded sector emissions in 2029 are predicted to increase from the baseline of 1.835 $MtCO_2e$ to 1.931 $MtCO_2e$.

Significance of Effects

15.9.32 In line with IEMA guidance (IEMA, 2017) all emissions are considered significant due to the permanent, cumulative nature of GHG emissions. In line with IEMA guidance the context of these changes in emissions, and their contribution to relevant carbon targets, are discussed in the following sections with reference to Tables 15.9.8 to 15.9.12.

15.9.33 The UK carbon budgets include domestic aviation, but do not include international aviation (see Section 15.2). The comparison below represents the emissions for the Project with the exclusion of international aviation emissions.

Table 15.9.8: Comparison of 2029 Emissions Against UK Carbon Budget

Carbon Budget	Period	Average Annual Carbon Budget ($MtCO_2e$)	Forecast Emissions from the Project for 2029 ($MtCO_2e$)	Contribution to Average Annual Carbon Budget
5th Carbon Budget	2028 - 32	345	0.609	0.18%

15.9.34 A fuller assessment of increased emissions from aviation, and the relevance to long term carbon targets, is provided later in this chapter. Future GHG emissions will be monitored through the existing annual corporate reporting.

GHG Emissions duing Operation of the Project (2038)

Operational Emissions

15.9.35 GHG operational emissions for the design year 2038 are presented in Table 15.9.9 below. A full breakdown is provided in Appendix 15.4.1. These operational emissions incorporate both baseline emissions and the additional emissions that would occur as a result of the Project, so as to represent the total emissions for Gatwick with the Project in 2038. The aviation emissions reflect changes in the expected aircraft fleet in the period to 2038. The projected emissions do not include any consideration of SAF within the operation of aircraft, or other improvements such as uptake of electrical or hydrogen powered aircraft.

Table 15.9.9: Operational Emissions Assessment for 2038

Emissions Activity	Design Year ($MtCO_2$)
	2038
Airport operation	**0.057**
Surface access	0.457
UK domestic flights	
LTO	0.027
CCD	0.053
Total	0.080
Non-domestic EEA flights	
LTO	0.283
CCD	1.832
Total	2.115
Non-EEA international flights	
LTO	0.181
CCD	4.685
Total	4.866
TOTAL	7.575

Total GHG Emissions for the Project (2038)

15.9.36 The emissions summary for the design year 2038 includes operational emissions and construction emissions and is presented in Table 15.9.10.

Table 15.9.10: Emissions Assessment Summary for 2038

Emissions totals	Design year ($MtCO_2$)
Construction emissions for the Project	**0**
Total excluding international air transport	**0.594**
Total operational emissions from international air transport	**6.981**
Total including international air transport	**7.575**

15.9.37 The design year 2038 traded emissions sector emissions are presented in Table 15.9.11. Traded sector emissions are those which fall under the UK ETS. These include domestic and non-domestic intra-EEU aviation emissions, and a portion of emissions generated by combustion plant owned and operated by Gatwick Airport Ltd. Emissions under UK ETS consider only CO_2 emissions (not the wider CO_2-equivalent emissions).

Table 15.9.11: Design Year (2038): Traded Sector Emissions

Emissions Totals	Design Year GHG Emissions ($MtCO_2$)
UK domestic flights [e]	0.080
Non-domestic EEA flights [f]	2.115
Gatwick Airport Ltd UK ETS emissions	0.002
Total traded sector emissions	**2.197**

* Table values do not sum due to rounding

Comparison with Baseline

15.9.38 The emissions for 2038, in total, are 1.387 $MtCO_2e$ above the 2038 baseline assessment. Of this increase:

- construction emissions in 2038 are zero for both the baseline and the with-Project scenario;
- airport operation emissions in 2038 have reduced from the baseline of 0.061 $MtCO_2e$ to 0.057 $MtCO_2e$;
- surface access emissions in 2038 have increased from the baseline of 0.382 $MtCO_2e$ to 0.457 $MtCO_2e$;
- aviation emissions in 2038 have increased from the baseline of 5.746 $MtCO_2$ to 7.061 $MtCO_2$; and
- traded sector emissions in 2038 have increased from the baseline of 1.843 $MtCO_2e$ to 2.197 $MtCO_2e$

Significance of Effects

15.9.39 In line with IEMA guidance (IEMA, 2017) all emissions are considered significant due to the permanent, cumulative nature of GHG emissions. In line with IEMA guidance the context of these changes in emissions, and their contribution to relevant carbon targets, are discussed in the

following section. A fuller assessment of increased emissions from aviation, and the relevance to long term carbon targets, is provided later in this chapter.

15.9.40 The UK has not yet adopted carbon budgets for the period beyond 2037, and the carbon budget for the period beyond 2037 is unlikely to be adopted for several years. However, the Sixth Carbon Budget has been confirmed for the period 2033-37 (it now includes international aviation). The annual average budget for this period is 193 MtCO2e (based on a five-year budget of 965 MtCO2e). Compared to the last year of the Sixth Carbon Budget (2037) the in-scope emissions (domestic and international) for 2038 are estimated as 7.575 MtCO2e per year – equivalent to 3.9% of the national emissions target for that year. This includes international aviation.

Further Mitigation

15.9.41 No further mitigation is expected beyond the activities set out in Section 15.8.

Future Monitoring

15.9.42 No further monitoring is expected beyond the activities set out in Section 15.8.

Worst Case Scenario

15.9.43 The Airports NPS requires that a 'worst case' scenario is assessed as part of the GHG assessment. Worst case has been interpreted as both the year of highest aggregated emissions, or the year in which emissions differ to the greatest extent from the baseline.

15.9.44 The assessment of worst case year for aggregate emissions from all sources (ie maximum emissions in any one year) is presented in Appendix 15.4.1. The worst case year for construction emissions is also set out in Appendix 15.4.1.

Table 15.9.12: Assessment of Worst Case Year Emissions

Emissions source	Worst case year	Emissions ($MtCO_2e$)	Difference from baseline ($MtCO_2e$)
Highest aggregate emissions	2038	7.575	+1.387
Greatest increase over baseline	2032	7.474	+ 1.514
Highest annual construction emissions	2025	0.389	zero baseline

GHG Emissions during Operation of the Project (2047)

15.9.45 The GHG assessment has assessed the impact of the Project for 2029 and 2038 to align with other topic assessments with which it shares common modelling (most pertinently the air quality assessment). The GHG has not assessed effects in 2047, but has provided consideration of aviation emissions out to 2050. By this point in time the majority of non-aviation emissions sources are expected to be at or near zero in line with national carbon targets. Aviation is likely to remain one of the sectors with residual emissions by 2050, albeit in the context of a wider net zero economy which relies on offsets and GHG removals to achieve overall Net Zero.

Assessment Against UK Long Term Targets

15.9.46 The Airports NPS (Department for Transport, 2018b) (para 5.82) notes that any increase in carbon emissions alone is not a reason to refuse development consent, unless the increase in carbon emissions resulting from the project is so significant that it would have a material impact on the ability of Government to meet its carbon reduction targets, including carbon budgets. The assessment of impact is further informed by other Government documentation including Making Best Use (MBU), and National Planning Policy Framework, and other recent or emerging policy in the TDP (DfT, 2021a) and the Jet Zero consultation (DfT, 2021b). The Jet Zero consultation affirms that MBU and the Airports NPS remain the most up-to-date policy on planning for airport development and continue to have full effect, notwithstanding the need for any increase in airport capacity to be compatible with the UK meeting its climate change obligations.

15.9.47 Calculated emissions for 2050 are presented in Table 15.9.13 for both the future baseline, and the future with the Project . This is a projection from the modelled 2038 emissions, scaled to reflect the forecast changes in ATMs for domestic, short and long haul flights.

- these represent scaled emissions from 2038 based on ATM changes;
- this initial assessment takes no account of expected efficiency changes in aircraft;
- the initial assessment takes no account of use of SAF; and
- the initial assessment takes no account of uptake of electric or hydrogen powered aircraft, which are expected to be in operation over the timeframe of the project for some domestic and short haul flights.

Table 15.9.13: Modelling of Future Aviation Emissions for 2050 (no inclusion of efficiency or SAF uptake)

	GHG Emissions 2050 ($MtCO_2$) for aviation only
GHG Emissions 2050 ($MtCO_2$) without the Project	6.424
GHG Emissions 2050 ($MtCO_2$) with the Project	7.512

15.9.48 Trajectories for national aviation emissions, and what can be achieved to bring them in line with the Net Zero commitment, have been produced by various bodies including UK Government, CCC, and Sustainable Aviation. Each makes use of a suite of factors to effectively reduce emissions to Net Zero, including:

- fuel efficiency improvements for aircraft at varying degrees and rapidity between now and 2050;
- use of sustainable aviation fuels at various levels and rate of uptake between now and 2050;
- use of zero emission aircraft for domestic and short haul flights;
- carbon pricing impacts; and
- use of abatement, offsetting and GHG removals to reduce to Net Zero.

15.9.49 An illustrative scenario has been modelled whereby the historic rate of engine efficiency adopted by the CCC in their Balanced Pathway model is assumed (1.4% per annum) but only for the period from 2038-2050. Estimates for the benefits of efficiency improvements vary across scenario modelling – this is a conservative estimate within the range used across different scenarios produced by Government, CCC and the aviation industry.

Table 15.9.14: Effect of Engine Efficiency Improvements between 2038 and 2050

	Aviation GHG Emissions in 2050 assuming 1.4% efficiency improvement from 2038-2050 ($MtCO_2$)	Reduction against counterfactual with zero efficiency improvement
GHG Emissions 2050 ($MtCO_2$) without the Project	5.424	15.6%
GHG Emissions 2050 ($MtCO_2$) with the Project	6.433	14.4%

15.9.50 The Jet Zero consultation reaffirms the Government's established policy of supporting UK airports making best use of existing runways.

15.9.51 The Jet Zero consultation states that growth in the aviation sector in the UK is not incompatible with meeting the UK's GHG reduction targets. The UK Government considers this can be achieved through a combination of improvement and accelerations in aircraft and airspace technology and efficiency; deployment of sustainable aviation fuels (derived from a range of sources and production routes); development of electric or hydrogen (or hybrid) aircraft especially for domestic or short haul flights; and further net reductions in atmospheric concentration of GHGs through offsets or carbon removals. The consultation acknowledges that the balance of benefits across each of these measures is uncertain, but that in aggregate they are expected to provide a route to Net Zero for the industry. The consultation also notes the need for collaboration between Government, airports, airlines, fuel suppliers and other actors within the aviation industry. It also proposes a five-yearly review of strategy, and notes the potential need for other measures to be introduced depending on progress.

15.9.52 The preliminary work for this PEIR has established an upper estimate on emissions for 2050 based on a 'Do nothing' scenario – eg where there are no improvements to aircraft, no transition to zero emissions flights, and no uptake of SAF. In reality these mechanisms will reduce sector emissions prior to use of offsetting to achieve Net Zero.

15.9.53 At this stage it is not considered that the scale of increased emissions from the Project for 2050 will impact upon the ability of UK to meet its carbon targets given the range of mechanisms whereby emissions can be reduced, and offset, given sufficient progress across Government and industry to deliver the innovation, infrastructure, and supply chains to reduce emissions from aircraft.

15.9.54 At the time of producing this PEIR the likely trajectory of the industry to Net Zero, and the impact of different industry mitigation measures to achieve this, are unclear. As the UK Government progresses through the Jet Zero consultation (with a likely decarbonisation trajectory developed for the UK aviation sector as part of this) more detailed analysis on the outturn emissions for 2050 will be enabled. Likely trajectories for future emissions arising from the Project, and the contribution of these to national emissions in the UK, will be presented in the ES.

15.9.55 Gatwick has started the work needed to explore and identify further actions needed to support this collective action both as part of current operations and with proposed development. In 2021 Gatwick published the Second Decade of Change policy, for the period to 2030, which includes

commitments to achieve 80% reduction on Scope 1 and 2 emissions by 2030 (against the 1990 baseline), and a longer-term goal to achieve 'net zero' by 2040, and to support the transition of UK aviation and ground transport to net zero.

15.9.56 Gatwick is currently developing a detailed Carbon and Climate Change Action Plan, alongside energy and transport strategies, to enable the airport to continue to reduce carbon emissions and to deliver sustainable development. The intention is to publish the draft Action Plan as part of the submission for development consent. The Action Plan will include measures and actions planned by Gatwick to deliver GHG reductions within areas of direct control, and these are set out in the Mitigation section 15.8. The Action Plan will also detail what activity Gatwick can take to contribute to the wider collective industry activity set out in the Jet Zero consultation.

15.10. Cumulative Effects

15.10.1 CCR requires consideration of the resilience of the design of an individual project to climate change. Assessment of cumulative effects is not relevant to this element of the chapter.

15.10.2 The ICCI assessment is an assessment of the exacerbation of climate change on existing effects. As the climate change projections have been included within each PEIR topic's primary assessment and are therefore carried through to the aspect-specific cumulative effects assessment, a separate climate change cumulative effects assessment is not required.

15.10.3 GHG emissions are inherently cumulative for the following reasons:

- the environmental impact arising from GHGs is the aggregation and increased concentration of GHGs within the atmosphere;
- the location of the emissions source is not relevant to the impact arising from it; any development leading to GHG emissions has the same impact whether it is located near to Gatwick or in another region/country; and
- the climate change impacts on a given location arise from the aggregated GHG levels in the atmosphere, not from the magnitude of GHG emissions in the local area.

15.10.4 Any attempt to compile a cumulative assessment of GHGs would have to include all development projects in the UK (as the impact of GHGs is not related to their emission location) and for this reason the approach for managing the cumulative GHG emissions across the UK is through the adoption of carbon budgets as developed by the CCC and adopted by the UK Government. This GHG assessment has considered whether the Project materially impacts the UK's ability to meet its carbon reduction targets and carbon budgets by 2050. In accordance with IEMA guidance, all GHG emissions are considered significant and considered to contribute to climate change. It is considered that this project would not have a material impact on the ability of the Government to meet its carbon reduction targets, including carbon budgets as they stand at present.

15.11. Inter-Related Effects

15.11.1 The CCR assessment is an assessment that looks at the resilience of the Project assets to future changes in climate. The inter-relationships with the other topic chapters have already been considered in the assessment within this chapter.

15.11.2 The ICCI assessment reviews the inter-relationships between climate change and all the other environmental topics as set out in the assessment above (Section 15.9).

15.11.3 The assessment of GHG emissions has taken into account data from a range of emissions sources which are related to other environmental topics (eg construction processes, transport impacts, air quality assessment). Beyond these links there are no further inter-related effects between the assessment of GHG emissions arising from the Project and effects on other environmental topics.

15.12. Summary

15.12.1 The CCR assessment identified several risks as being high or very high during the construction and operation phase. Mitigation for these risks is being developed such that the design would be resilient to climate change. With such measures in place, significant effects are not likely.

15.12.2 No significant effects have been identified thus far through the ICCI assessment for the construction or operational phases.

15.12.3 The GHG assessment has assessed the calculated GHG emissions arising from the Project and confirms that these are significant, in line with guidance which considers all net emissions arising from a project as significant. The GHG emissions arising from aviation form the greatest proportion of overall emissions. 2038 emissions from all sources are 7.575 $MtCO_2e$ (including all international aviation) compared with a future baseline projection of 6.188 $MtCO_2e$ in the absence of the Project. This includes an element of fleet turnover affecting aviation emissions, but no inclusion of more widespread decarbonisation mechanisms such as increased efficiency of engines and use of sustainable aviation fuels.

15.12.4 A full assessment of the mitigation opportunities, and quantification of these in terms of GHG emission reduction, has not been carried out for this PEIR. Mitigation will be quantified within the final ES and will comprise mitigation measures as indicated in Table 15.8.3. Mitigation measures are likely to reduce those emissions under most control by Gatwick Airport – namely construction related emissions, and those relating to surface access by passengers and staff. Other mitigation measures will also be quantified for their contribution to reducing the Project emissions from operation of the airport and its buildings.

15.12.5 On the basis of this assessment it is expected that the Project would not have a material impact on the ability of Government to meet its carbon reduction targets, including carbon budgets as they stand at present.

Table 15.12.1: Summary of Effects

Receptor	Receptor Sensitivity	Description of Impact	Short/medium/long term/permanent	Magnitude of Impact	Significance of Effect	Significant/ not significant	Notes
Construction Phase							
Project itself and its users (CCR)	N/A	Lack of resilience of assets to extreme weather events (ie flooding or heatwaves)	Medium-long term temporary	Up to high/very high level of risk prior to further design mitigation.	With suitable mitigation in place, likely to be reduced such that effect not significant.	Not significant	Based on current design information for some assets, the magnitude of impact has been designated as very high risk. Suggestions for mitigation as part of design have been provided and further assessment will be completed during the ES when there is a better understanding of the risk profile.
ICCI	N/A	ICCI	Short-term temporary	Minimal	Not significant	Not significant	Based on the current development of mitigation, and the likely progress during the next phase, no significant effects have been identified. Once more detailed mitigation is defined this assessment

Receptor	Receptor Sensitivity	Description of Impact	Short/medium/long term/permanent	Magnitude of Impact	Significance of Effect	Significant/ not significant	Notes
							will be reviewed (as part of the ES).
GHG	N/A	Emission of GHGs	Long term	N/A	Significant	Significant	IEMA guidance indicates that all emissions of GHG are significant
Operational Phase							
Project itself and its users (CCR)	N/A	Lack of resilience of assets to future climate change	Permanent (long term)	Very low to very high level of risk prior to further design mitigation.	With suitable mitigation in place, likely to be reduced such that effect not significant.	Not significant	Given limited design information for some assets, the magnitude of impact has been designated as very high risk. Suggestions for mitigation as part of design have been provided and further assessment will be completed during the ES when there is a better understanding of the risk profile
ICCI	N/A	ICCI	Long term	Minimal	Not significant	Not significant	Based on the current development of mitigation, and the likely progress during the next phase, no significant effects have

Receptor	Receptor Sensitivity	Description of Impact	Short/medium/long term/permanent	Magnitude of Impact	Significance of Effect	Significant/ not significant	Notes
							been identified. Once more detailed mitigation is defined this assessment will be reviewed (as part of the ES).
GHG (all years)	N/A	Emission of GHGs	Long term	N/A	Significant	Significant	IEMA guidance indicates that all emissions of GHG are significant

15.13. Next Steps

15.13.1 Discussions will continue with the design teams as the design of the Project progresses to understand better the risk profile for the receptors where high risks were identified in the CCR assessment. A sensitivity analysis will be undertaken to consider more extreme climate changes and the impact this may have on the resilience of the Project. The preliminary CCR assessment will be updated based on the final Project Description and the findings will be presented in the ES.

15.13.2 The ICCI assessment will be updated based on the final assessment from other relevant topics and presented in the ES. This will include a review of the CoCP, a better understanding of the contents of mitigation documents for several disciplines and confirmation of flood risk and drainage design that will be developed for use during the construction phase. Further mitigation may be proposed, if considered necessary, following any scheme refinements and further assessment as part of the ES.

15.13.3 The forecast GHG emissions will be reviewed in preparation for the final ES. Specifically, the following will be considered in further detail:

- the scale of aircraft emissions will be reviewed to take into account the likely evolution and use of sustainable aviation fuels, and to reflect expected gradual transition to electric / hybrid aircraft in use on some domestic and short haul routes;
- more developed data on the design of buildings and infrastructure, and a more informed estimate of the material requirements and waste arisings from the construction of the Project;
- improved information from the strategic transport modelling to inform the assessments of surface access emissions;
- confirmation of the mitigation measures to be implemented and their effect on reducing the emissions arising from the Project including benefits of measures in the Carbon and Climate Change Action Plan currently under preparation; and
- any changes to UK carbon budgets resulting from the revision to the Climate Change Act.

15.13.4 Further GHG assessment work will be progressed to assess fully the impact of land use changes within the assessment, and also to include emissions arising from retail freight. However, neither of these are expected to change the emissions forecasts for the Project significantly or the conclusions of the assessment.

15.13.5 Next steps will also see close working with the Project design teams to confirm the adoption of mitigation measures through design of the airport facilities and highways infrastructure, optimisation of material sourcing and recycling of cut/fill materials, management of construction stage emission, and the adoption of an energy strategy to reduce emissions arising from airport operations. The opportunities to mitigate impacts of the Project through both construction and operation will be collated into the draft Carbon and Climate Change Action Plan to support the submission for development consent. The ES will seek to quantify the GHG impacts of mitigation measures in the final ES.

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15.15. Glossary

Table 15.15.1: Glossary of Terms

Term	Description
AEED	Aircraft Engine Emissions Databank
ANPS	Airports National Policy Statement
APU	Auxiliary Power Units
ATM	Air Traffic Movement
AWP	Adverse Weather Plan
BEIS	Department for Business, Energy and Industrial Strategy

Term	Description
BSI	British Standards Institute
CAA	Civil Aviation Authority
CCAR	Climate Change Adaptation Report
CCC	Committee on Climate Change
CCD	Climb-Cruise-Descent
CCR	Climate Change Resilience
CCRA	Climate Change Risk Assessment
CEA	Cumulative Effects Assessment
CIBSE	Chartered Institute of Building Services Engineers
CORSIA	Carbon Offsetting and Reduction Scheme for International Aviation
CO_{2e}	Carbon Dioxide equivalent
DCO	Development Consent Order
DEFRA	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges
EEA	European Economic Area
EIA	Environmental Impact Assessment
ES	Environmental Statement
EU ETS	European Union Emission Trading Scheme
FEGP	Fixed Electrical Ground Power
FRA	Flood Risk Assessment
GAL	Gatwick Airport Limited
GHG	Greenhouse Gas
GPU	Ground Power Units
GSE	Ground Support Equipment
ICAO	International Civil Aviation Organization
ICCI	In-combination Climate Change Impacts
IEMA	Institute of Environmental Management and Assessment
IPCC	Intergovernmental Panel on Climate Change
LTO	Landing and Take-off
MBU	Making Best Use
N_2O	Nitrous Oxide
NAP	National Adaptation Programme
NDC	Nationally Determined Contribution
NN NPS	National Networks National Policy Statement
NO_x	Oxides of Nitrogen
NPPF	National Planning Policy Framework
NPPG	National Planning Practice Guidance
NPS	National Policy Statement
PEIR	Preliminary Environmental Information Report
PSO	Public Service Obligation
RCP	Representative Concentration Pathway

Term	Description
RF	Radiative Forcing
RICS	Royal Institution of Chartered Surveyors
SAF	Sustainable Aviation Fuel
SF_6	Sulphur Hexaflouride
SoS	Secretary of State
TDP	Transport Decarbonisation Plan
UKCP	UK Climate Projections
UNFCCC	United Nations Framework Convention on Climate Change
WBCSD	World Business Council for Sustainable
WRI	World Resources Institute
ZEF	Zero Emission Flight
ZoI	Zone of Influence

Preliminary Environmental Information Report
Chapter 16: Socio-Economics

September 2021

Table of Contents

16 Socio-Economics

16.1. Introduction

16.1.1 This chapter of the Preliminary Environmental Information Report (PEIR) presents the findings of the Environmental Impact Assessment (EIA) work undertaken to date concerning the potential effects of the proposal to make best use of Gatwick's existing runways (referred to within this report as 'the Project') in relation to socio-economics.

16.1.2 This PEIR chapter considers the potential socio-economic effects of the Project during the construction and operational phases. Socio-economics is a broad topic that includes the assessment of multiple effect types such as new employment, implications for the labour market and population and disruption to business and community activities. These socio-economic effects are closely linked with effects assessed in other PEIR chapters (eg Chapter 12: Traffic and Transport, Chapter 14: Noise and Vibration, Chapter 17: Health and Wellbeing and Chapter 18: Agricultural Land Use and Recreation and) and a number of technical reports prepared for the Project.

16.1.3 In particular, this PEIR chapter:

- sets out the existing and future environmental baseline conditions, established from desk studies, published data sources and consultation to date;
- presents the potential environmental effects on socio-economics arising from the Project, based on the information gathered and the analysis and assessments undertaken to date;
- identifies any assumptions and limitations encountered in compiling the environmental information; and
- highlights any necessary monitoring and/or mitigation measures that could prevent, minimise, reduce or offset the possible significant environmental effects identified in the EIA process.

16.1.4 This chapter is accompanied by the following appendices:

- Appendix 16.2.1: Summary of Local Planning Policies.
- Appendix 16.3.1: Stakeholder Consultation – Socio-economics.
- Appendix 16.6.1: Socio-Economics Data Tables.
- Appendix 16.6.2: Assessment of Population and Housing Effects.

16.1.5 The PEIR will inform pre-application consultation. Following consultation, comments on the PEIR will be reviewed and taken into account, where appropriate, in the preparation of the Environmental Statement (ES) that will accompany the application to the Planning Inspectorate for development consent.

16.2. Legislation and Policy

16.2.1 This section of the chapter reviews legislation, planning policy and other documentation that is relevant to assessing the socio-economic effects of the Project.

Legislation

16.2.2 The key legislation relevant to the socio-economics chapter are the Equality Act (2010) and the Infrastructure Planning (Environmental Impact Assessment) Regulations (the '2017 Regulations'). The Equality Act (2010) is relevant to the PEIR in relation to the assessment of effects in determining that particular groups are not disproportionately affected by negative effects and that all groups have access to the benefits and opportunities associated with the Project. The approach to the assessment of equality in regard to groups with protected characteristics will be set out in the separate Equalities Impact Assessment (EqIA) which will accompany the application for development consent.

16.2.3 The process of Environmental Impact Assessment in the context of nationally significant infrastructure projects in England is governed by the '2017 Regulations'.

Planning Policy Context

National Policy Statements

16.2.4 The Airports National Policy Statement (NPS) (Department for Transport, 2018), although primarily provided in relation to a new runway at Heathrow Airport, remains a relevant consideration for other applications for airport infrastructure in London and the south-east of England.

16.2.5 The NPS for National Networks (Department for Transport, 2015[1]) sets out the need for the development of road, rail and strategic rail freight interchange projects on the national networks and the policy against which decisions on major road and rail projects will be made. This has been taken into account in relation to the highway improvements proposed as part of the Project.

16.2.6 On this basis, Table 16.2.1 provides a summary of the relevant requirements of these NPSs and how these are addressed within the PEIR socio-economic assessment.

[1] It is noted that the Transport Decarbonisation Plan published by Department for Transport (DfT) on 14 July 2021 announced DfT's intention to review the NPS for National Networks in due course once demand patterns post-pandemic become clearer. It is understood DfT intends to commence the review by the end of 2021 and complete it by Spring 2023. In the interim and whilst the review is undertaken, DfT has confirmed the NPS for National Networks remains relevant government policy and has full force and effect for the purposes of the Planning Act 2008.

Table 16.2.1: Summary of NPS Information Relevant to this Chapter

Summary of NPS Requirement	How and Where Considered in the PEIR
Airports NPS and National Networks NPS	
When weighing the adverse impacts of a proposed development against its benefits, the Examining Authority and Secretary of State will take into account its potential benefits, including the facilitation of economic development (including job creation) as well as any measures to avoid, reduce or compensate for any adverse impacts (Airports NPS, Paragraph 4.4 and National Networks NPS: Paragraph 4.3)	This paragraph outlines general principles for how the socio-economic effects of the Project should be assessed. This chapter assesses both positive and negative socio-economic (including employment) effects associated with the Project, and other factors relevant to economic development, based on the assessment undertaken to date. The chapter also considers the potential effects on existing businesses and the community both during construction and operation.
Environmental, safety, social and economic benefits and adverse impacts should be considered at national, regional and local levels. These may be identified in the Airports NPS, or elsewhere. The Secretary of State will also have regard to the manner in which such benefits are secured, and the level of confidence in delivery (Airports NPS, Paragraph 4.5 and National Networks NPS: Paragraph 4.4).	Other potential effects on local people are assessed within Chapters 8: Landscape, Townscape and Visual Resources, 13: Air Quality, 14: Noise and Vibration, 17: Health and Wellbeing and 18: Agricultural Land Use and Recreation. Mitigation measures are set out in each chapter.
Airports NPS	
The Secretary of State will also consider whether the applicant has consulted on the details of a community compensation fund, including the source of revenue, size and duration of fund, eligibility, and how delivery will be ensured (Paragraph 5.252).	Gatwick currently operates an existing community fund through the Gatwick Airport Community Trust across the areas affected by the airport's operations, within Surrey, West Sussex, East Sussex and Kent. This is complemented by the Gatwick Foundation Fund which supports a range of community projects across Kent, Surrey and Sussex, and is managed by the individual Community Foundations. Further compensation proposals are currently under review in relation to impacts arising from the Project.

Summary of NPS Requirement	How and Where Considered in the PEIR
The Government expects the applicant to maximise the employment and skills opportunities for local residents, including apprenticeships (Paragraph 5.266).	This chapter considers the scale and type of direct employment associated with the Project both during construction and operation, and the approach to skills and training based on the assessment undertaken to date. The assessment is informed by the Outline Employment, Skills and Business Strategy (see Table 16.8.1) which is being developed for the Project that sets out an overarching strategy for how Gatwick will seek to enhance the skills, employment and training opportunities for both existing and new members of the labour market during construction and operation.
NPS for National Networks	
The economic case prepared for a transport business case will assess the economic, environmental and social impacts of a development. The information provided will be proportionate to the development (Paragraph 4.5).	The economic effects of the Project are assessed within Section 16.9 of this chapter.
Where appropriate applicants should seek to deliver improvements that reduce community severance and improve accessibility (Paragraph 3.22).	Community severance is considered within Chapter 12: Traffic and Transport and Chapter 17: Health and Wellbeing.

National Planning Policy Framework

16.2.7 The National Planning Policy Framework (NPPF) (Ministry of Housing, Communities and Local Government, 2021) sets out the overarching planning policy framework for development in England. The NPPF is based on the principle of sustainable development, which includes three core objectives related to the economy, society and the environment. The economic and social objectives of the NPPF are pertinent to assessing the socio-economic effects of the Project.

16.2.8 The economic objective is to build a strong, competitive economy (paragraph 8[a]), and therefore planning policies and decisions should help create the conditions in which businesses can invest, expand and adapt (paragraph 81). Accordingly, significant weight should be placed on the need to support economic growth and productivity. The economic role of airports is specifically recognised to the extent that planning policies should take into account their economic value in serving business, leisure, training and emergency service needs, and the Government's General Aviation Strategy (paragraph 106[f]).

16.2.9 The social objective emphasises the use of the planning system to support vibrant and healthy communities, by fostering a well-designed and safe built environment, with accessible services and open spaces that reflect current and future needs and support communities' health, social and cultural wellbeing (paragraph 8[b]). Accordingly, planning policies and decisions should aim to achieve healthy, inclusive and safe places that promote social interaction, are safe and accessible, and enable and support healthy lifestyles (including through the provision of green infrastructure) (paragraph 92).

Other Relevant National Planning Policy

National Planning Practice Guidance

16.2.10 The National Planning Practice Guidance (NPPG) (Ministry of Housing, Communities and Local Government, first published in 2016) Environmental Impact Assessment section (last updated in 2020) supports the NPPF and provides guidance across a range of topics.

Local Planning Policy

16.2.11 Gatwick Airport lies within the administrative area of Crawley Borough Council and adjacent to the boundaries of Mole Valley District Council to the north west, Reigate and Banstead Borough Council to the north east and Horsham District Council to the south west. The administrative area of Tandridge District Council is located approximately 1.9 km to the east of Gatwick Airport, while Mid Sussex District Council lies approximately 2 km to the south east. Gatwick Airport is located in the county of West Sussex and directly borders the county of Surrey.

16.2.12 The relevant local planning policies applicable to socio-economics based on the local study area for this assessment are listed in Table 16.2.2, with further detail provided in Appendix 16.2.1.

Table 16.2.2: Local Planning Policy

Administrative Area	Plan	Policy
Adopted Policy		
Crawley	Crawley 2030: Crawley Borough Local Plan 2030	GAT1: Development of the Airport with a Single Use Runway
		GAT4: Employment Uses at Gatwick
		EC1: Sustainable Economic Growth
Reigate and Banstead	Reigate and Banstead Local Plan: Core Strategy 2014	CS5: Valued People & Economic Development
		CS9: Gatwick
	Reigate and Banstead Local Plan Development Management Plan 2018-2027	HOR9: Land West of Balcombe Road
		EMP1 & 2: Principal & Local Employment Areas
		EMP5: Secure Local Skills & Jobs
Mole Valley	Mole Valley Core Strategy 2009	CS12: Sustainable Economic Development
	Mole Valley Local Plan 2000	E1 & E2: Employment
Horsham	Horsham District Planning Framework 2015	7: Economic Growth
		9: Economic Development
Tandridge	Tandridge District Core Strategy 2008	CSP22: The Economy
Mid Sussex	Mid Sussex District Plan 2014-2031	DP1: Sustainable Economic Development
	Mid Sussex Local Plan 2004	E1: Business
Emerging Policy		
Crawley		SD2: Enabling Healthy Lifestyles and Wellbeing

Administrative Area	Plan	Policy
	Submission Draft Crawley Borough Local Plan 2021-2037	OS1: Open Space, Sport and Recreation
		OS2: Provision of Open Space and Recreational Facilities
		OS3: Rights of Way and Access to the Countryside
		EC1: Sustainable Economic Growth
		EC2: Economic Growth in Main Employment Areas
		EC5: Employment and Skills Development
		EC6: High Quality Office Provision
		EC7: Hotel and Visitor Accommodation
		EC11: Employment Development and Residential Amenity
		EC13: Rural Economy
		GAT1: Development of the Airport with a Single Runway
		GAT2: Safeguarding for a Second Runway
		GAT3: Gatwick Airport Related Parking
		GAT4: Employment Uses at Gatwick
Horsham	Draft Horsham District Local Plan 2019-2036	Strategic Policy 6: Economic Growth
		Strategic Policy 7: Employment Development
		Strategic Policy 11: Tourism Facilities and Visitor Accommodation
Mole Valley	Future Mole Valley 2018-2033 Consultation Draft Local Plan	Policy EC1: Supporting the Economy
		Policy EC7: Leisure and Tourism
Tandridge	Our Local Plan 2033	TLP20: Supporting a Prosperous Economy

Other Relevant Documents

16.2.13 Other policy and strategy documents relevant to the socio-economic effects of the Project are summarised in Table 16.2.3.

Table 16.2.3: Other Documents

Summary of Other Relevant Policy
Coast to Capital Local Enterprise Partnership (LEP): Gatwick 360° Strategic Economic Plan 2018 – 2030 (2018)
The Coast to Capital Strategic Economic Plan states a vision to be the most dynamic non-city region in England, centred around Gatwick Airport. The Plan focuses on the role that Gatwick Airport plays in the region, describing it as an 'engine for growth' that gives the region a competitive advantage. **Business Infrastructure:** Priority 2: Develop business infrastructure and support. The area already benefits from a strong base to build from in terms of demand for business space that outstrips the supply. However, the ambition is to develop more flexible, high-quality, sustainable enterprise space, to remain attractive to existing businesses and the industries of the future. The LEP has stated that to achieve this goal they

Summary of Other Relevant Policy
will actively support the delivery of business space for the area, including statutory and market-led frameworks and incentives. **Skills:** Priority 4: Create skills for the future. The area is already one of the most skilled with 44.6% of people holding a degree-level qualification which sits at 6% above the national average. In order to maintain and improve the areas skill level the LEP aims to create a Coast to Capital Employment and Skills Board which will 'build strong partnerships between education and skills providers and employers and to ensure that delivery matches the changing requirements of industry, with a focus on STEM (science, technology, engineering and maths), digital and basic skills'. **Innovation:** Priority 5: Pioneer innovation in core strengths. The plan aims to utilise the innovative nature of the region as the South East of England is the third most innovative place in Europe. **Profile:** Priority 8: Build a strong national and international profile. There is an ambition to build a strong national and international profile, and through foreign direct investment and the visitor economy, the LEP believes that this can be achieved.
Coast to Capital LEP: Local Industrial Strategy Draft Economic Profile (2019a)
Coast to Capital LEP is in the process of developing a Local Industrial Strategy (LIS) and has published a Draft Economic Profile report to inform this. Relevant findings from this report are set out below: **Gatwick Diamond:** The Gatwick Diamond is an economic area comprising seven local authorities (Crawley, Horsham, Mid Sussex, Tandridge, Reigate & Banstead, Mole Valley and Epsom & Ewell). Key sectors in the Diamond include medical engineering, aerospace and service industries, particularly located at Manor Royal Business Park. However, businesses have reported difficulties recruiting for highly technical jobs, primarily due to the shortage of skills and no local higher education institution. The LEP report highlights that there is still significant potential for additional value to be added to the Coast to Capital region, with areas such as Thames Valley and Manchester managing to extract greater value and investment from their international airports. **Offices:** The Gatwick Diamond had an active office market between 2013 and 2018, with over 1,100 office lease deals and almost 400 sales being completed over the period. Office rents within the Gatwick Diamond in 2018 were some of the highest within the LEP area, with average rents exceeding £20 per sqft in Crawley, Reigate and Banstead, Mole Valley and Epsom and Ewell. In 2019, around 7% of office space was vacant within the Gatwick Diamond which was higher than in other parts of the LEP area such as Brighton and Hove and Croydon (1% and 4% respectively). **Industrial:** Demand for industrial floorspace within the Gatwick Diamond remains high with around 550 industrial leases signed and nearly 250 units sold between 2013 and 2018. Industrial rents in the Gatwick Diamond in 2018 were some of the highest within the LEP area with average rents exceeding £10 per sqft in Crawley, Reigate and Banstead, Mole Valley and Epsom and Ewell. The average industrial vacancy rate within the Gatwick Diamond

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during 2019 was 7% which was higher than other parts of the LEP including Croydon and Chichester (3% and 4% respectively).
Coast to Capital LEP: Local Industrial Strategy Evidence Base Reports
Coast to Capital LEP is in the process of developing a Local Industrial Strategy (LIS) and has published a series of supporting evidence to inform the LIS. These include: **Urban Centres Research, LIS Evidence Base (2019b)** This evidence acknowledges the important role of the urban centres as drivers of the Coast to Capital economy, and the opportunity that the process of developing the Local Industrial Strategy presents in maintaining and enhancing their strength and competitiveness. The study concludes that the area around Gatwick Airport, including Crawley and Horley urban centres, and the north of Horsham, presents arguably the greatest opportunity for 'transformational' growth within Coast to Capital's urban centres. The study supports the delivery of the 'Gatwick City' aspiration that requires a long-term strategic focus, close working with government and cross boundary collaboration. **Skills and Labour Market Study (2019c)** The Skills Advisory Panel commissioned Hatch Regeneris to prepare the Skills and Labour Market Research which follows the structure set out in the Analytical Framework and Toolkit produced by Department for Education to analyse the current skills profile of the LEP areas and identify the skills challenges faced locally. The evidence suggests that Crawley together with Adur and Arun face educational attainment and access to higher education challenges. These areas have high concentration of education deprivation with large proportions of these areas in the top 20% most deprived nationally. Moreover, over 10% of businesses report a skills shortage, with demand for specialist skills and general "work readiness". Mid-level occupation roles such as associate and technical professions, skills trades and caring, leisure and other services are the hardest occupations for employers to fill. This reflects sector strengths in construction, manufacturing, visitor economy and transport. **Commercial Property Study, LIS Evidence Base (2019d)** The Gatwick Diamond Functional Market covers the administrative areas of Crawley, Epsom and Ewell, Horsham, Mid Sussex, Mole Valley, Reigate and Banstead and Tandridge. This area concentrates both industrial and office demand and according to the evidence Crawley is the "engine room" of this demand driven by Manor Royal Business Park and Gatwick Airport. In terms of office, the findings suggest that Gatwick Diamond has an undersupply of office space, although the average rents make commercial developments viable, highlighting the issue of constrained land. The study suggests that Gatwick Diamond concentrate demand for large office areas (1,000 sqm or above) with over 2,500 deals transacted across Gatwick Diamond between 2013 and 2018 period and the rental values at the level of £23-27/sq ft in Crawley suggest that these schemes are viable across the area. A large proportion of the transactions related to occupiers moving to higher quality premises enabling the overall stock to replenish itself either through refurbishment or redevelopment. Industrial space and particularly warehousing and distribution premises have seen a strong demand with very low availability and vacancy rates on good-quality stock. Demand for warehousing premises outweighs supply in Crawley. The evidence suggests that there is low stock of high-quality in general, which constrains the aspirations

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and priorities for business growth. Evidence support clearly the rationale for new high-quality industrial space in the right locations.
Enterprise M3 LEP: Strategic Economic Plan (2018)
The LEP sets out five priorities for growth. 1) High-value sectors for a Globally Facing Economy. 2) Enterprise and Innovation for Scaling Up High Productivity SMEs. 3) Skills for a High-Value Growth Economy. 4) Connectivity for a 21st Century Advanced Digital and Low Carbon Economy. 5) Dynamic Communities and Sustainable Growth Corridors. The plan states a target for growth for the Enterprise M3 area up to 2030 of 4% Gross Value Added (GVA) growth per annum, using the above five main priorities of growth to deliver the targeted level of GVA growth. **Importance of airports:** The Enterprise M3 area benefits from great international connectivity being near the country's largest airports. One of the greatest benefits from this is the high-value international export sector of the region which represented £14.6 billion worth of goods in 2015.

16.3. Consultation and Engagement

16.3.1 In September 2019, GAL submitted a Scoping Report (Gal, 2019a) to the Planning Inspectorate, which described the scope and methodology for the technical studies being undertaken to provide an assessment of any likely significant effects and, where necessary, to determine suitable mitigation measures for the construction and operational phases of the Project. It also described those topics or sub-topics which are proposed to be scoped out of the EIA process and provided justification as to why the Project would not have the potential to give rise to significant environmental effects in these areas.

16.3.2 Following consultation with the statutory bodies, the Planning Inspectorate (on behalf of the Secretary of State) provided a Scoping Opinion on 11 October 2019 (Planning Inspectorate, 2019).

16.3.3 Key issues raised during the scoping process specific to socio-economics are listed in

16.3.4 Table 16.3.1 together with details of how these issues have been addressed within the PEIR.

Table 16.3.1: Summary of PINS Scoping Responses

Details	How/Where Addressed in PEIR
Planning Inspectorate	
The Inspectorate does not consider that sufficient information has been provided to demonstrate that an increase in worker numbers, during both construction and operation, would not affect the demand for housing and community infrastructure. The Inspectorate, therefore, does not agree that effects on	Potential effects on the population are included within the baseline (Section 16.6) and assessment (Section 16.9).

Details	How/Where Addressed in PEIR
population (including impacts on the housing supply) can be scoped out of the assessment (paragraph 4.10.1)	
The Proposed Development would potentially open new trading links and bring foreign direct investment (FDI) into the local economy. The proposed methodology for the assessment includes consideration of policy positions and socio-economic objectives of local and regional authorities. The Scoping Report does not explain the extent to which effects on FDI and trade account for the objectives at a local and regional authority level. On this basis, the Inspectorate considers that these matters should be assessed where relevant to that methodology (paragraph 4.10.2).	Some qualitative analysis of FDI and trade effects is included in the Oxera Economic Impact Report submitted alongside the PEIR (Oxera, 2021).
The Inspectorate assumes there must be some deviation of existing flight paths from flights departing the northern runway before they join existing routes. In addition, there will be an increase in the frequencies of flights along the existing flight paths. For this reason, the Inspectorate does not agree that the effects on property value can be scoped out of the assessment. The ES should assess any likely significant effects associated with the Proposed Development in relation to this matter (paragraph 4.10.3).	The issues of flightpath changes and their likely impacts are considered fully in Chapter 14: Noise and Vibration, together with the mitigation appropriate to address the assessed impacts in line with other airport applications for development consent. The PEIR, and subsequently the ES, will assess the potential impacts of noise to the residential properties in proximity; however, property values are primarily affected by other factors such as property characteristics, condition, size, location, neighbouring uses, comparable properties and the performance of the local market, which expand beyond the scope of the PEIR.
The local study area is stated to include areas falling within six local authorities. It is depicted in Figure 7.10.1; however, it is unclear if the local study area covers the entirety of these authorities. The local study area should be spatially defined and justified in greater detail in the ES (paragraph 4.10.4).	The local study area comprises areas within, but not the full entirety, of six local authorities. Further details are provided at paragraph 16.4.7and on the figures that accompany this chapter.
The temporal scope of the assessment is not explicitly set out in the Scoping Report. This should be clearly identified within the ES and made relevant to the assessment years (paragraph 4.10.5).	The temporal scope of the assessment is detailed within the key Project parameters that form the basis of the assessment (Section 16.7). This is based on the indicative phasing information included in Chapter 5: Project Description.
Table 7.10.2 confirms that economic effects would be assessed across the following study areas: local; labour market and five authority areas. The data collected to date and presented in the Scoping Report represent the local study area only. The Applicant should ensure that baseline	A review of baseline conditions for all of the assessment areas is set out in Section 16.6.

Details	How/Where Addressed in PEIR
characteristics of the wider socio-economic area are recorded to enable an assessment of effects to these areas (paragraph 4.10.6).	
The ES should set out details of economic projections applicable to the Proposed Development, which will inform the assessment as well as any assumptions or limitations with the projections and show how these relate to relevant projections for demographic and population change Paragraph 4.10.7).	Economic projections associated with the Project have been prepared and have been used to assess effects in terms of employment as detailed in Section 16.9. The future baseline (Section 16.6) includes details of forecast economic and demographic changes within the assessment area, which have been considered as part of the assessment of employment and labour market effects.
Employment at the airport could exacerbate a shortage of lower-skilled workers in the local area and have negative consequences on non-airport related employment sectors. This impact should be assessed within the ES. The ES should provide a breakdown of the numbers and types of jobs that would be created during both construction and operation (paragraph 4.10.8).	Breakdowns of the numbers and types of jobs for the construction and operational phases are highlighted in separate tables for each phase of the assessment in Section 16.9.
The Scoping Report states that receptor sensitivity will be based upon the criteria set out in Chapter 6. The definitions of receptor sensitivity set out in Table 6.2.1 are fairly generic and describe receptor importance, rarity, scale and the potential for substitution. It should be clear in the ES how these categories have been applied to socio-economic receptors (paragraph 4.10.9).	This is set out in Table 16.4.4. The main sensitive receptors for the employment and labour market effects are businesses; employees; labour supply; and the local, regional and wider economy. It is not possible to ascribe a 'value' to these receptors as sensitivity varies based on the capacity and ability to respond to change. Economies are dynamic and adaptive. However, individual businesses may be less so based on labour or physical accommodation needs. The main sensitive receptors for community and business disruption effects are the population and economy as influenced by resources and receptors as identified by other environmental effects which lead to socio-economic consequences (eg transport, land use and recreation, noise and air quality).
Effects on Gross Value Added (GVA) generated by additional jobs and additional local spend should be assessed in the ES where significant effects are likely to occur (paragraph 4.10.10).	See Section 16.9 for the GVA effects arising from the operational phase of the Project.

Details	How/Where Addressed in PEIR
The Applicant should have regard to indirect and induced impacts, eg to existing supply chains and employee expenditure. The ES should assess these impacts where a likely significant effect is anticipated to occur (paragraph 4.10.11).	See Section 16.9 for the indirect and induced effects arising from the operational phase of the Project. Further work will be undertaken for the final ES on these effects during the construction phase.

16.3.5 Key issues raised during consultation and engagement with interested parties specific to socio-economics are listed in Table 16.3.2, together with details of how these issues have been addressed within the PEIR.

Table 16.3.2: Summary of Consultation

Consultee	Date	Details	How/where addressed in PEIR
Socio-Economics and Employment Local Authority Topic Working Group			
Planning officers from neighbouring authorities	28 August 2019	The scope of the socio-economic assessment was presented to planning officers from neighbouring authorities along with work to date on other reports (eg airport-related employment land) that are linked to the Project. The purpose of the workshop was to help officers understand the nature of the assessment.	Detailed responses on the scope were not raised by stakeholders at the workshop, but are incorporated in the Scoping Opinion that was issued in October 2019.
Technical Officers Group Workshop			
Planning officers from authorities in the wider region	3 September 2019	The scope of socio-economic was presented to planning officers from authorities that are in the wider South East and London alongside the scope of other reports linked to the Project. The purpose of the workshop was to outline the nature of the assessment.	Detailed responses on the scope were not raised by stakeholders at the workshop, but are incorporated in the Scoping Opinion that was issued in October 2019.
Socio-Economics and Employment Local Authority Topic Working Group			
Planning officers from neighbouring authorities	30 January 2020	The preliminary findings of the assessment were presented prior to the project being suspended due to pandemic.	The feedback was considered when the project ‘re-started’ and particularly when assessing the different impacts.
Socio Economics & Employment (incl. Health Impacts) Topic Working Group			
Planning officers from	3 August 2021	The preliminary findings of the assessment were presented.	Responses were taken into consideration on finalising the PEIR before submission. The

Consultee	Date	Details	How/where addressed in PEIR
neighbouring authorities			feedback did not impact on the initial findings or the methodology adopted.

16.4. Assessment Methodology

Relevant Guidance

16.4.1 The 2017 EIA Regulations identify population as a factor to be considered within the assessment process but do not provide definitive guidance on the approach, process or methodology to follow. The Airports NPS provides general guidance on the approach to considering the socio-economic effects of the Project, and this has informed the methodology that has been applied.

Scope of the Assessment

16.4.2 The scope of this PEIR has been developed in consultation with relevant statutory and non-statutory consultees as detailed in

16.4.3 Table 16.3.1 and Table 16.3.2. Overall, the assessment analyses the potential socio-economic effects of the Project on receptors in up to four separate study areas, depending on the nature of the effect being assessed. Effects are set out separately for the construction and operational phases across four assessment years (see Chapter 6: Approach to Environmental Assessment).

16.4.4 The assessment draws upon other environmental assessments, including Chapter 12: Traffic and Transport, Chapter 14: Noise and Vibration and Chapter 18: Agricultural Land Use and Recreation together with Chapter 17: Health and Wellbeing, together with the Economic impact of the northern runway project prepared by Oxera (2021), to inform the assessment of some socio-economic effects, namely business and resident disruption and displacement.

16.4.5 Taking into account the scoping and consultation process, Table 16.4.1 summarises the issues considered as part of this assessment.

Table 16.4.1: Issues Considered within the Assessment

Category	Effect	Impact	Study Area(s)	Receptor
Construction				
Economic	Employment	Temporary direct employment change	Local, labour market and five authorities' area	Business and commercial activity
	Supply chain	Temporary indirect employment change	Local, labour market and five authorities' area	Supply chain businesses and commercial activity

Category	Effect	Impact	Study Area(s)	Receptor
Labour Market	Labour market	Temporary apprenticeships, training opportunities and access to work	Local and labour market areas	Workforce and commuting patterns
Disruption	Business disruption	Access severance and environmental change	Site, local and labour market areas	Businesses and commercial activity
	Business displacement	Change of access to premises, car parking and land	Site, local and labour market areas	Businesses and commercial activity
	Resident disruption	Loss of access, journey time increases and severance from locations of employment	Local and labour market areas	Workforce and residents
Population	Population	Change in the local population related to the introduction of a temporary workforce	Local and labour market areas	Existing and new residents
	Housing	Change in the availability of housing relating to the introduction of a temporary workforce	Local and labour market areas	Existing and new residents
Community	Facilities and services	Viability, sustainability and accessibility to community infrastructure, recreational facilities and public space	Site and local areas	Existing and new residents
	Cohesion	Introduction of a temporary construction workforce	Site and local areas	Existing residents and community assets
Operation				
Economic	Employment	Permanent direct employment change	Local, labour market and five authorities' area	Business and commercial activity
	Supply chain	Permanent indirect employment change	Local, labour market and five authorities' area	Supply chain businesses and commercial activity
Labour Market	Labour market	Permanent apprenticeships, training opportunities and access to work	Local and labour market areas	Workforce and commuting patterns
Disruption	Business disruption	Change in access, journey times, labour access and the environment	Site, local and labour market areas	Businesses and commercial activity
	Business displacement	Change of access to premises, car parking and land	Site, local and labour market areas	Businesses and commercial activity
	Resident disruption	Change in journey times and access to locations of employment	Local and labour market areas	Workforce and residents

Category	Effect	Impact	Study Area(s)	Receptor
Population	Population	Change in the size of the local population	Local and labour market areas	Existing and new residents
	Housing	Change in the availability of housing	Local and labour market areas	Existing and new residents
Community	Facilities and Services	Viability, sustainability and accessibility to community infrastructure, recreational facilities and public spaces	Site and local areas	Existing and new residents
	Cohesion	Changes to community assets	Site and local areas	Existing residents and community assets

16.4.6 Effects which are not considered likely to be significant have been scoped out of the assessment. A summary of the effects scoped out are presented in Table 16.4.2.

Table 16.4.2: Issues Scoped Out of the Assessment

Issue	Justification
Foreign Direct Investment (FDI) and Trade	There is potentially a positive relationship between investment in transport infrastructure and FDI and trade. However, Government guidance (Department for Transport, 2020) notes that there is not sufficient evidence to quantify the impact of FDI, and as such does not currently provide guidance for the analysis of such impacts. In the absence of an established methodology and guidance, these impacts are scoped out of the assessment but are considered in qualitative terms in the Oxera Economic Impact Report (2021).
Property Value	The value of property is variable due to the multiple drivers that can influence residential and commercial property markets trends. Drivers such as macro-economic and market cycles, changes in Government fiscal policy and external events represent exogenous factors that may influence property values to varying degrees. Therefore, the effect on property values inside the Project site boundary is scoped out of the assessment. It is not considered that there are likely to be direct impacts on residential or commercial properties outside the Project site boundary due to the very limited change in flight paths and therefore the potential for effects to arise is limited. Environmental effects arising from these changes have been assessed and appropriate mitigation proposed.

Study Area

16.4.7 There is no standard method for defining study areas for socio-economic assessments, although consideration has been given to the NPPG advice in relation to identifying Functional Economic Market Areas (FEMAs), which are essentially the spatial geographies across which local economies and markets operate. The approach to defining the study areas has been influenced by the geographic extent of the area across which potentially significant effects on socio-economic receptors might reasonably be predicted to arise as a result of the Project, taking into account the differences in the nature and range of potential socio-economic effects generated by the Project. The study areas used for the different effects being assessed are presented in Figures 16.4.1 and 16.4.2 and consist of the following.

- Project Site Boundary – to capture impacts upon receptors that are located within the Project site. Airport users (ie airlines and customers) are not considered to be a receptor for the purposes of the socio-economic assessment.
- Local Study Area – the study area is defined using selected Office for National Statistics (ONS) 2011 Census output areas (Appendix 16.6.1, Table 1.1.1), which incorporate the whole of Crawley and parts of Horsham, Mid Sussex, Mole Valley, Reigate and Banstead and Tandridge. The selection of output areas is based upon a 'best fit' match of the urban area surrounding Gatwick Airport, incorporating the main towns of Crawley and Horley and some smaller settlements located near to the Project site boundary such as Charlwood and Hookwood. These settlements represent the areas where receptors are most likely to be affected by the Project during construction and operation and contain the majority of resources that may be accessed by new workers during the construction and operational phases of the Project.
- Labour Market Area – defined based on the application of the 75% commuting threshold used by the ONS for defining Travel-to-Work Areas (TTWAs) (ONS, 2016), using local authority boundaries. This has been defined using ONS 2011 Census Origin and Destination commuting data and Gatwick Airport's in-house passholder database (pre Covid-19 pandemic data). The labour market area represents the wider extent of where impacts linked to the economic and labour market effects of the Project may impact upon receptors, as this is the area from which Gatwick Airport currently draws the majority of its operational workforce and can be expected to in the future. The labour market area includes the following local authority areas: Crawley, Mole Valley, Reigate and Banstead, Croydon, Tandridge, Wealden, Lewes, Brighton and Hove, Mid Sussex, Horsham, Eastbourne, Adur, Worthing and Arun. Some parts of the labour market area also fall within the South Downs National Park Authority.
- Five Authorities Area – this area reflects where the widest socio-economic effects of the Project could impact on receptors. The area aligns with the 'five authorities' area contained in the Oxera Economic Impact Report (2021) which is one of the other technical reports prepared for the Project and has been used to inform the assessment of socio-economic effects in this chapter. The five authorities' area comprises the County areas of East Sussex, West Sussex, Surrey, Kent and Brighton & Hove (unitary authority).

16.4.8 The study areas are cumulative, so the wider areas incorporate the smaller areas. The study areas are used for assessing socio-economic effects during the construction and operational phases of the Project in each of the four-time periods included within the assessment section of this chapter, namely the initial construction phase (2024 – 2029), first full year of opening (2029), interim assessment year (2032) and design year (2038).

Methodology for Baseline Studies

Desk Study

16.4.9 A desk study has been undertaken to identify the existing and future socio-economic conditions within each of the study areas. The latest available data from each source has been used, which in most cases includes data up to Q1 2020 (ie the last data point which reflects a pre-Covid position). Depending on the specific data source and the frequency of its reporting, data from 2019 is also referenced in some to reflect the pre-Covid baseline position.

16.4.10 The main data sources used for the study (for which full references are given at the end of this Chapter under Section 16.14 References) are as follows.

- Cambridge Econometrics (2021), (see further details in Appendix 16.6.2).
- Crawley Borough Council (2021b) Leisure and Culture Facilities.
- Department for Education (2021).
- Ministry of Housing, Communities and Local Government (MHCLG, 2019a) Indices of Multiple Deprivation.
- MHCLG (2019b) Live Tables on Dwelling Stock.
- National Fire Chiefs Council (2021).
- NHS (2020) General Practice Workforce.
- NHS (2021) Services Search Portal.
- ONS (2020a) Annual Population Survey.
- ONS (2020b) Annual Survey of Hours and Earnings.
- ONS (2020c) Business Register and Employment Survey.
- ONS Census (2011).
- ONS (2020d) House Price Statistics.
- ONS (2018a) Housing Affordability for Middle Super Output Areas.
- ONS (2020e) Housing Affordability Ratios.
- ONS (2021) Jobseekers Allowance.
- ONS (2020f) Mid-Year Population Estimates.
- ONS (2018b) Sub-National Population Projections.
- ONS (2016) Travel-to-work Areas.
- ONS (2020g) UK Business Counts.
- Ordnance Survey (2021).
- Police UK Police Station Finder (2021).
- Sport England (2021).
- Surrey County Council (2021).
- West Sussex County Council (2021).
- Yell (2021).

16.4.11 Within these data sources, specific tables referred to are included under the notes of each table in Appendix 16.6.1.

16.4.12 A range of further sources have been consulted in respect of social and community infrastructure provision as part of the desk study. These sources are listed under the applicable tables and the reference section of Appendix 16.6.1.

16.4.13 In addition, a number of technical outputs prepared for the Project have informed the approach and assessment, including the following.

- Forecasts of direct employment numbers for the Project, produced by ICF, that accompany the Gatwick Airport Masterplan (Gatwick Airport Limited, 2019b).
- The Economic Impact Report for the Project, produced by Oxera (2021).
- Assessment of Population and Housing Effects, produced by Lichfields (Appendix 16.6.2).

Site-Specific Surveys

16.4.14 No site-specific surveys have been directly undertaken for this chapter. The chapter draws upon site-specific surveys from other chapters including Chapter 18: Agricultural Land Use and Recreation.

Assessment Criteria and Assignment of Significance

16.4.15 There is no UK legislation or government guidance that specifies the detailed content required for socio-economic assessments or applicable standards and thresholds for the assessment of the significance of effects.

16.4.16 The significance of an effect is determined based on the sensitivity of a receptor and the magnitude of an impact. This section describes the criteria applied in this chapter to characterise the sensitivity of receptors and the magnitude of potential impacts. The terms used to define magnitude and sensitivity are based on and have been adapted from those used in the Design Manual for Roads and Bridges (DMRB) methodology (Highways England *et al*., 2020), which is described in further detail in Chapter 6: Approach to Environmental Assessment.

16.4.17 Sensitivity is broadly the capacity of the relevant receptor to absorb or respond to the effect, which may be influenced by the geographical extent of the receptor, and the context of the effect in terms of recent rates of change. The main sensitive receptors for the socio-economic assessment are population and the labour market, local businesses and community, and the local and regional economy. It is not possible to ascribe a single 'value' to each of these receptors. The assessment, therefore, focuses on the sensitivity of each receptor and, in particular, on their capacity and ability to respond to change (eg by substitution through alternative activities).

16.4.18 Where socio-economic effects are determined in relation to the impacts considered in another PEIR chapter (eg disruption arising from traffic impacts identified in Chapter 12: Traffic and Transport), the scale and magnitude of the corresponding socio-economic impact is assumed to be the same as that in the other assessment.

Receptor Sensitivity/Value

16.4.19 The criteria for defining sensitivity for socio-economic receptors are outlined in Table 16.4.3 below.

Table 16.4.3: Sensitivity Criteria

Sensitivity	Definition
Very High	Where a receptor has very limited ability to respond to change and therefore very limited potential for substitution[2].
High	Where a receptor has limited ability to respond to change and therefore limited potential for substitution.
Medium	Where a receptor has some ability to respond to change and therefore some potential for substitution.
Low	Where a receptor is particularly responsive to change with potential for substitution without substantial effects on existing status.
Negligible	Where a receptor is dynamic to the extent that the existing status is characterised by continuous change and ongoing substitution.

[2] Substitution generally refers to the ability and extent to which a receptor can be partly or fully replaced, or an alternative provided. For example, loss of public open space could be substituted with similar public open space in a location nearby .

Magnitude of Impact

16.4.20 The magnitude of potential impacts is benchmarked against the sensitivity of the receptor using quantitative information where possible or a qualitative assessment based on professional judgement. The criteria for defining magnitude for socio-economic impacts are outlined in Table 16.4.4 below.

Table 16.4.4: Impact Magnitude Criteria

Magnitude of Impact	Definition
High	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements (Adverse).
	Large scale or major improvement of resource quality; extensive restoration or enhancement; major improvement of attribute quality (Beneficial).
Medium	Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements (Adverse).
	Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality (Beneficial).
Low	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements (Adverse).
	Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring (Beneficial).
Negligible	Very minor loss or detrimental alteration to one or more characteristics, features or elements (Adverse).
	Very minor benefit to or positive addition of one or more characteristics, features or elements (Beneficial).
No Change	No loss or alteration of characteristics, features or elements; no observable impact in either direction.

Significance of Effect

16.4.21 The significance of the effect upon socio-economics has been determined by taking into account the sensitivity of the receptor and the magnitude of the impact. The method employed for this assessment is presented in Table 16.4.5. Where a range of significance levels is presented, the final assessment for each effect is based upon professional judgement.

16.4.22 In all cases, the evaluation of receptor sensitivity, impact magnitude and significance of effect has been informed by professional judgement and is underpinned by the narrative to explain the conclusions reached.

16.4.23 For the purpose of this assessment, any effects with a significance level of minor or less are not considered to be significant in terms of the EIA Regulations.

Table 16.4.5: Assessment Matrix

Sensitivity	Magnitude of Impact				
	No Change	Negligible	Low	Medium	High
Negligible	No change	Negligible	Negligible or Minor	Negligible or Minor	Minor
Low	No change	Negligible or Minor	Negligible or Minor	Minor	Minor or Moderate
Medium	No change	Negligible or Minor	Minor	Moderate	Moderate or Major
High	No change	Minor	Minor or Moderate	Moderate or Major	Major or Substantial
Very High	No change	Minor	Moderate or Major	Major or Substantial	Substantial

16.4.24 A description of the significance levels is provided below.

- Substantial: Only adverse effects are normally assigned this level of significance. They represent key factors in the decision-making process. These effects are generally, but not exclusively, associated features of international, national or regional importance that are likely to suffer a most damaging impact and loss of resource integrity. However, a major change of local importance may also enter this category.
- Major: These beneficial or adverse effects are considered to be very important considerations and are likely to be material in the decision-making process.
- Moderate: These beneficial or adverse effects may be important but are not likely to be key decision-making factors. The cumulative effects of such factors may influence decision-making if they lead to an increase in the overall adverse effect on a particular resource or receptor.
- Minor: These beneficial or adverse effects may be raised as local factors. They are unlikely to be critical in the decision-making process but are important in enhancing the subsequent design of the Project.
- Negligible: No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

16.5. Assumptions and Limitations of the Assessment

16.5.1 This chapter represents a desk-based study of existing and future baseline conditions and is a fixed point-in-time assessment which is liable to change in the future as the sources are refreshed, updated or replaced with new measures of the same conditions. For example, some ONS data (such as the Annual Population Survey) is updated quarterly, other ONS data annually (such Mid-Year Population Estimates) and some datasets less often (such as the Census, which takes place every 10 years). Most data referred to in this chapter was obtained in March and April 2021, however 2019 position is also presented for consistency purposes.

16.5.2 On this basis and in line to the approach adopted in this PEIR, the baseline analysis of this chapter presents a pre-pandemic position. This is considered an appropriate baseline for the assessment that is likely to be more representative of socio-economic conditions in the longer-term as opposed to the use of specific data points associated with the period of the Covid-19 pandemic when there was significant disruption to the economy and labour market. As explained in detail in section 2 of Appendix 4.3.1, the Covid-19 pandemic is expected to have a limited

influence on the Project as the effects of the pandemic are expected to have fully subsided by 2029 (the Project's 'opening year').

16.5.3 Some data sources referred to in this chapter are available at all statistical geographies (ie from a national to an Output Area (OA) level). This is the case for most Census data and some annual data, such as population estimates. However, many datasets are not available down to this level, instead being limited mostly to local authority (district/unitary) level and in some cases down to Middle or Lower Super Output Area (MSOA/LSOA) level. Because the local study area is defined using OAs, some data is not available for the exact geography of the local study area. Where this is the case, a 'best-fit' of MSOAs or LSOAs to the local study area is used, depending on which geography is available for the dataset in question. Where a best-fit of MSOAs or LSOAs is used this is noted in the 'notes' for each table in Appendix 16.6.1 and in footnotes throughout this chapter.

16.5.4 The assessment presented in Section 16.9 below has been based on the construction phasing presented in Table 16.7.1 (further details are provided in Chapter 5: Project Description), with a project design year of 2038. It should be noted that other assessments within this PEIR (such as Chapter 12: Traffic and Transport) that follow the requirements of the Design Manual for Roads and Bridges (DMRB) requirements additionally consider post-completion effects in 2047.

16.5.5 The findings of this assessment are preliminary at this stage and may require updating for the ES. However, no specific assumptions or limitations have been identified in the preparation of this chapter that would prevent an assessment of the potential effects being made.

16.6. Baseline Environment

Current Baseline Conditions

Demographics and Labour Market Profile

Population

16.6.1 The local study area, labour market area and five authorities' area have all seen population growth of similar rates in recent years, all exceeding the national average. The local study area has seen an increase in its total population of 6.7%, growing from 140,798 residents in 2011 to 150,244 in 2019. Over the same period the population of the labour market area has grown by 6.4% and the five authorities' area has grown by 6.6%. This compares with national average growth rate of 6.0% (ONS, 2020f) (see Appendix 16.1.1 Table 2.1.1).

16.6.2 The local study area has a younger population than the wider areas, with 21.4% of residents being age 0-15 as of 2019, compared with just under 19% in the wider areas. The local study area has seen significant growth in the number of people age 0-15, which has increased by 14.0% since 2011; this is higher than the labour market area (where the number of 0-15 year olds has grown 6.9%), the five authorities' area (7.5%) and England as a whole (7.8%).

16.6.3 For working age people (aged 16-64) and the elderly (aged 65+) trends have been similar across all three areas (local study area, labour market area and five authorities' area). Across all three areas the working age population (aged 16-64) has seen the least growth, at around 3% or slightly lower. Still, growth in the working age population in all areas slightly exceeds the average for England where the number of 16-64 years old has increased by only 2.2% in the 2011 to 2019 period.

16.6.4 Similarly, all three areas have seen the fastest growth in over 65s between 2011 and 2019. In the local study area the number of over 65s has increased by 17.3%, in the labour market area 17.6% and in the five authorities' area 18.3%. This is in line with wider trends towards ageing; nationally the number of over 65s has increased by 18.6% between 2011 and 2019.

16.6.5 In 2011, the local study area population of 140,798 people amounted to 7.1% of the total population of the labour market area (1,986,188 people) and 3.3% of the five authorities' area total population (4,210,913 people). As of 2019, the proportion of each area that the local study area represents remains unchanged, with the local area now representing 150,244 residents out of 2,113,056 in the labour market area and out of 4,489,665 in the five authorities area.

16.6.6 The five authorities' area represented 7.9% of England's population in 2011 (4,210,913 out of 53,107,169 people); this has since increased marginally to 8.0% in 2019 (4,489,886 out of 56,286,961 people).

16.6.7 Further details on the population in the study areas are available in Appendix 16.6.1 (Table 2.1.1) and Appendix 16.6.2.

Ethnicity and Religion

16.6.8 The local study area is more diverse in terms of ethnic groups and religion compared with the labour market area or five authorities' area. In the local study area 83.1% of residents identify themselves as 'white' compared with 86.1% in the labour market area and 92.8% in the five authorities' area (ONS, 2011). This is shown in Appendix 16.6.1, Table 2.1.2. The local study area has a notably higher proportion of residents who identify themselves as Asian/Asian British (at 10.7%) compared with the wider area's equivalents (5.8% for the labour market area and 3.8% for the five authorities' area).

16.6.9 Similarly, the local study area has a higher proportion of residents who identify themselves as having a religion (67.1% compared with 64.1% in the labour market area and 64.8% in the five authorities' area) but a lesser proportion who report their religion as Christian. This is shown in Appendix 16.6.1, Table 2.1.3. Religions which are notably higher in the local study area are Hinduism (3.7%, compared with 1.7% in the labour market are and 0.9% in the five authorities' area) and Islam (5.8%, compared with 2.7% and 1.5% respectively).

Economic Activity and Unemployment

16.6.10 The 2011 Census provides the last dataset for which comparable information on economic activity is available for the local study area and the wider areas. At the time of the 2011 Census, 70.5% of residents aged 16 and over in the local study area were economically active (ONS, 2011), of which, 93.8% were in employment and 6.2% were unemployed. At the same time, economic activity rates were much lower across the labour market area and five authorities' area, where only 64.5% and 63.6% of residents age over 16 were economically active respectively and this is likely to reflect the fact that these areas have older age profiles than the study area (hence, of its over 16 population, a higher percentage will be economically inactive due to being retired) (see Appendix 16.6.1. Table 2.1.4).

16.6.11 Having a younger age profile than the labour market area or five authorities' area explains partly why the local study area has a higher economic activity rate (looking at all residents age 16 and over). However, looking specifically at working age economic activity (ie those aged 16 to 64) shows that in the study area a higher percentage are economically active (82.5%) compared with

either of the wider areas (79.3% in the labour market area and 78.9% in the five authorities' area). This indicates that in the wider areas more working age people are inactive (this inactivity could be due to being in full-time education, looking after the home/family, being long-term ill/disabled or another reason) compared with the local study area.

16.6.12 More up-to-date information on economic activity and unemployment is available from ONS in its Annual Population Survey (APS), but only at a local authority level (ie only for the labour market area and five authorities area). This suggests the economic activity amongst working age residents has increased slightly in both areas since the 2011 Census with the labour market area now having an economic activity rate amongst 16-64 year olds of 82.0% (in the year October 2019 to September 2020) and the five authorities' area 82.3% (see Appendix 16.6.1 Table 2.1.4) (ONS, 2020a). However, it should be noted that the APS is a survey and therefore is subject to a much greater margin of error than the Census (where the margin of error is deemed to be minimal given it is intended to cover the whole population).

16.6.13 The Census showed that as of 2011 the rate of unemployment across economically active people aged 16-64 in the local study area, labour market area and five authorities' area were all in the region of 6%. This was lower than the national average at the time of 7.6%; a relatively high rate due to being in the aftermath of the 2008 recession. More recent figures suggest unemployment rates across working age people have fallen since 2011, with 3.1% of economically active 16-64 year olds in the labour market area being unemployed in the year to December 2019 and a comparable rate of 3.2% across the five authorities' area.

16.6.14 A detailed overview of economic activity in the local study area at the time of the 2011 Census is shown in Figure 16.6.1, based on lower super output areas (LSOAs). This shows that economic activity was generally high across most of Horley and in certain parts of Crawley, such as in the Maidenbower area. More up-to-date information for the labour market area and five authorities' area for the periods January-December 2019 to October 2019-September 2020 is shown in Appendix 16.6.1 Table 2.1.4. This shows that economic activity rates for those age 16 and over in the labour market area was 65.0% in the year January-December 2019 and has been fairly stable at c.65% since (including in the year to September 2020). For those age 16-64 the economic activity rate in the labour market area was 81.4% in January-December 2019 and has since been stable at c.82%. Economic activity rates in the five authorities' area have been similarly stable over the 2019 period (and into 2020) with c.65% of 16 and overs and c.82% of 16-64 year olds being economically active.

16.6.15 The most recent economic activity rates for local authorities in the labour market area are shown inset in Figure 16.6.1. It shows that despite there being pockets of low economic activity rates in Crawley (at the time of the Census), the borough as a whole has the third highest economic activity rate amongst working age residents (16-64) in the labour market area as of 2020, with 85.0% of residents being economically active. This compares with 87.5% in Adur (where economic activity is the highest) and 85.3% in Mole Valley. Economic activity amongst working age residents is lowest in Eastbourne (77.2%) and Arun (78.7%) (ONS, 2020a).

16.6.16 Further and more recent data on economic activity and employment is available in Appendix 16.6.1, Table 2.1.4.

Jobseekers Allowance Claimants

16.6.17 ONS Jobseekers Allowance (ONS, 2021) data shows that the number of residents in the local study area[3] claiming jobseekers allowance had fallen from 410 in January 2019 to 285 in March 2020. This pattern is similar in the labour market area (falling from 4,510 to 2,915 claimants in the same period) and five authorities' area (12,645 to 7,110 claimants). This mirrors the national trend, which saw the number of jobseekers had fallen from 247,000 in January 2019 to 137,000 in March 2020.

16.6.18 Additional details on those claiming jobseekers allowance are presented in Appendix 16.6.1 Tables 2.1.5 and 2.1.6.

Occupations

16.6.19 The Census shows the occupation of residents in the local study area is more skewed towards services and other elementary occupations and less towards managerial and professional roles when compared with the labour market area and five authorities' area. In 2011, 35.3% of employed residents in the local study area held occupations in Standard Occupational Classifications (SOC) 1-3; this represents those comprising managers, directors and senior officials; professional occupations; associate professional and technical occupations (ONS, 2011). This compares with 44.9% across the labour market area and 44.7% across the five authorities' area at the same time (see Appendix 16.6.1 Table 2.1.7).

16.6.20 A breakdown of those holding occupations in SOC groups 1-3 within the local study area by LSOA is shown in Figure 16.6.2, which shows that the proportion is notably higher in Horley than in Crawley. In many parts of Crawley town there are areas where fewer than 25% of residents hold an occupation in groups 1-3. Figure 16.6.2 also shows the proportion holding occupations in groups 1-3 in each authority in the labour market area as of 2020; this shows Crawley has the lowest rate in the labour market area at 39.9%. The highest proportion of residents working in these occupations is found in Brighton and Hove (60.4%) (ONS, 2020a).

16.6.21 Consequently, in the local study area 30.3% of residents held occupations in SOC groups 7-9 as of 2011, comprising sales and customer service occupations; process, plant and machine operatives; elementary occupations. This is higher than the labour market area (22.0% at the time of the Census) and five authorities' area (22.6%). Figure 16.6.3 shows a local breakdown of the proportion of residents in SOC group 7-9 occupations as of 2011; this mirrors Figure 16.6.2, showing that in many areas in/around Crawley town centre the proportion of residents holding occupations in SOC group 7-9 is in excess of 35%. Figure 16.6.3 also shows local authority figures for the labour market area as of 2020; the highest rate is found in Arun (23.2%), with Crawley ranking 5th at 17.0% (ONS, 2020a).

16.6.22 Additional details on occupations in the local study area, labour market area and five authorities' area are given in Appendix 16.6.1 Table 2.1.7.

Qualifications

16.6.23 The nature of residents' occupation in the local study area is also reflected in the qualification level of those living in the study area. Of working age (16-64) adults in the local study area the 2011 Census shows that 24.2% are educated to equivalent National Vocational Qualifications

[3] Based on a best-fit of LSOAs to the local study area.

(NVQ) level four or higher (eg higher national certificate or higher) with 12.7% carrying no qualifications (ONS, 2011). At the same time, in the labour market area 33.1% held NVQ Level 4+ qualifications and only 11.3% held no qualifications. The picture was similar at across the five authorities' area with 31.8% holding NVQ Level 4+ qualifications and 12.0% holding no qualifications. This is shown in Table 2.1.8 of Appendix 16.6.1.

16.6.24 The most recent data (ONS, 2020a) suggests that education of the working age population across the labour market area and five authorities' areas as a whole is increasing. By the year to December 2019[4] the proportion of working age adults in the labour market area with no qualifications had fallen to 5.4% (compared with 11.3% recorded in the 2011 Census) and in the five authorities' area this had fallen to 6.1% (compared with 12.0% at the time of the 2011 Census). This is likely due (at least in part) to the cohort effect – those who were age 55-64 at the time of the 2011 Census no longer form part of the working age cohort and have been 'replaced' with those in their early-mid 20s (who were below age 16 at the time of the 2011 Census) who are much more likely to be educated to NVQ Level 4+.

16.6.25 Figures 16.6.4 and 16.6.5 show qualifications of working age people in the local study area (at 2011) and the labour market area (at 2020). They show that within the local study area residents living in Horley and to the east of Crawley are more likely to be educated to higher levels, with areas in the south-west of Crawley most likely to hold no qualifications (or NVQ Level 1 only). Despite Crawley having the second lowest rate of residents' education to NVQ Level 4+ as of 2020 (with 53.7% of residents educated to this level (ONS, 2020a)) Crawley also has the third lowest level of residents with no qualifications of NVQ Level 1 (11.0%). This illustrates that a notably high proportion of residents are educated to some degree, even if not educated to Level 4+; 35.4% of residents in Crawley (the highest in the labour market area) hold qualifications from NVQ Levels 2-3, which includes GCSEs (A*-C), Level 2 certificates/diplomas/awards, A Levels and advanced apprenticeships.

16.6.26 Reflecting the high proportion of residents working in professional occupations, Brighton and Hove has the highest educated working age population in the labour market area with 75.7% of residents holding NVQ Level 4+ qualifications. The rate is similar in Mole Valley, at 74.2%.

16.6.27 Additional details on qualifications in the local study area, labour market area and five authorities' area are given in Appendix 16.6.1 Table 2.1.8.

Earnings

16.6.28 Workplace earnings (the earnings of those who work in an area, ie earnings associated with jobs in an area) are lower than resident earnings (the earnings of those who live in an area) across the labour market area and five authorities' area as of 2020 (ONS, 2020b). This suggests that those who live in these areas generally commute out of the area to better paid jobs elsewhere – most likely to be London.

16.6.29 Whilst current trends suggest a pattern of out-commuting to higher paid jobs, this may change in the future as workplace earnings across both areas have been growing at higher rates than

[4] Whilst data on qualifications was obtained from the Annual Population Survey in April 2021 (and the majority of APS data was available up to September 2019 at that point) recent data on qualifications was missing and therefore the latest data point available was the year January to December 2019.

resident earnings. If this trend continues it is possible that workplace earnings could catch-up to (or exceed) resident earnings.

16.6.30 Average median resident earnings of the constituent authorities in the labour market area as of 2020 are £497.57 (gross, weekly earnings for all workers) which represents a 14.1% increase over the last 10 years (since 2010). The five authorities' area saw a marginally higher level of increase, of 14.7% with earnings of £503.53 as of 2020. Over the same period however, workplace earnings in the labour market area increased by 19.2%, from £393.28 in 2010 to £468.70 as of 2020. The five authorities saw a slightly lesser increase (although still exceeding that of its resident earnings) of 18.0%, from £393.58 to £464.87).

16.6.31 Additional details of earnings for the labour market area and five authorities' area are given in Appendix 16.6.1 Table 2.1.9.

Deprivation

16.6.32 The Indices of Multiple Deprivation (IMD) measures deprivation across neighbourhoods nationally across seven domains; income, employment, education, health, crime, barriers to housing and services and living environment. Figure 16.6.6 indicates that the areas with the highest levels of deprivation (being ranking in the top 30% most deprived areas nationally) in the local study area are in the south west of Crawley (Southgate and Broadfield areas), with the least deprived areas located in the eastern half of Crawley (Pound Hill, Maidenbower) and in the northern parts of Horley (MHCLG, 2019a). Areas of high deprivation broadly correspond where economic activity amongst working age residents is lower, a higher proportion of residents hold occupations in SOC groups 7-9 and where education levels are lower.

16.6.33 Looking across the wider labour market area shows that most districts suffer with deprivation to some degree; this is typically (but not exclusively) focused in urban areas, particularly in Croydon and parts of Brighton and Hove.

Employment

16.6.34 The ONS Business Register and Employment Survey dataset (ONS, 2020c) shows there are an estimated 111,000 jobs in the local study area[5] as of 2019 (see Appendix 16.6.1, Table 2.1.10). This represents 12.4% of jobs in the labour market area, based on the BRES estimate of 895,000 jobs[6] as of 2019. Jobs in the transport and storage sector make up a significant proportion of jobs in the local study area; 22.5% as of 2019 (see Appendix 16.6.1, Table 2.1.11 for a full breakdown of jobs by industry in the local study area from 2015 to 2019). A significant proportion of jobs are also in the business administration and support services sectors, representing 14.4% of all jobs in the local study area.

16.6.35 In the labour market area, Cambridge Econometrics (CE, 2021) estimates there were 1,033,020 jobs as of 2020, an increase of 86,089 (9.1%) over the previous 10 years (ie from 2010 to 2020). However, the change in jobs shown in CE's forecast over the 2019-20 year is -22,367; a decline of 2.1% in this single year (see Appendix 16.6.1 Table 2.1.10). This is most likely due to the impacts of the Covid-19 pandemic and the impact of the UK leaving the European Union. Notable sectors which saw a decline in jobs between 2019 and 2020 in CE's forecast in the labour market

[5] Based on a best-fit of LSOAs to the local study area.
[6] Note the BRES estimate of jobs in the labour market area as of 2019 (895,000) differs to the estimate of jobs from the Cambridge Econometrics Forecast (March 2021) which indicates there were 943,000 jobs in the labour market area in 2019. This difference is due to the different methodologies and data sources used in each dataset.

area are agriculture (from 9,214 to 7,207 jobs), transport and storage (58,842 to 54,911), accommodation and food services (76,650 to 71,617 jobs) and financial and business services (237,850 to 223,837 jobs); this is shown in Appendix 16.6.1, Table 2.1.12.

16.6.36 Despite a decline in the number of jobs in the labour market area of 2.1% in 2019-20, CE forecasts modest growth averaging 0.4% per year (ranging from 0.3% to 0.7%) from 2020 onwards. Further information on the CE forecasts and their potential implications (in terms of housing need across the study area, which includes the labour market area) is set out in Appendix 16.6.2, Sections 3.2 and 3.3.

16.6.37 The rate of job growth in the five authorities' area has slightly outpaced that seen in the labour market area; over the 2010-20 period job growth was 10.0% in the five authorities' area (compared with 9.1% in the labour market area). There are similarities in trends between the two areas, however, over the 2009-19 period job growth in both areas was 13.7%. The split of jobs by industry is also broadly similar between the labour market area and five authorities' area, as shown in Appendix 16.6.1 Table 2.1.12.

16.6.38 Full details of employment including a breakdown by industry for the local study area, labour market area and five authorities' area are shown in Appendix 16.6.1, Tables 2.1.10, 2.1.11 and 2.1.12.

Commuting

16.6.39 Crawley (and Gatwick Airport) sits broadly central in the Crawley travel-to-work area (TTWA) (ONS, 2016). TTWAs represent broadly self-contained areas within which people typically live and work[7] and the Crawley TTWA extends north to the M25, south to Haywards Heath and Burgess Hill and west covering much of Horsham district.

16.6.40 The largest flows of workers commuting in the Project Site Boundary[8] in 2011 originate in the areas that are located nearest as shown in Figure 16.6.7 (ONS, 2011). This includes most of Crawley, Horley, and parts of Horsham, Mid Sussex and Mole Valley. Of all those travelling to work in the Project Site Boundary 39.3% originate within the local study area and 83.2% originate in the labour market area. Beyond the labour market area, long-distance commuters to the Project Site Boundary typically come from London, with commuters from the labour market area and London accounting for 89.9% of all commuters into the Project Site Boundary (ONS, 2011).

16.6.41 Analysis of Gatwick Airport's passholder database (passholders as of 2019) broadly aligns with 2011 Census findings, as shown in Figure 16.6.8.

Method of Travel to Work

16.6.42 Census data indicates that within the local study area the most common method of travelling to work for those age 16 and over who were in employment was by car or van (61.4% as a driver plus a further 4.8% as a passenger) (ONS, 2011). This rate of car usage is higher than the labour market area (53.1% as driver, 4.0% as passenger) and five authorities' area (58.9% and 4.5% respectively). The rate of people working from home was also lower in the local study area (3.7% compared to 6.7% in the labour market area and 6.9% in the five authorities' area). It is

[7] In addition to having self-containment criteria, TTWAs are also subject to other criteria such as minimum economically active population, and where this minimum cannot be met self-containment criteria may be adjusted. Alternative TTWA definitions are available based on varying criteria.
[8] Based on a best fit of Output Areas to the Project Site Boundary.

reasonable to expect there to have been a significant change in working patterns as a result of the Covid-19 pandemic particularly in jobs which are less reliant on face-to-face contact, although it is known that the local study area contains a significant proportion of jobs where such working is unlikely to be possible (for example in the transport and storage sectors and hospitality sectors).

16.6.43 Looking at more sustainable methods (public transport, bicycle and walking) shows a mixed picture in the local study area when compared with wider averages. For example, more people commute via bus (or minibus or coach) in the local study area than the labour market or five authorities' areas (9.0% compared with 7.0% and 4.2% respectively). However fewer people travel to work by train or on foot. The proportion cycling to work is broadly the same across all areas, at around 2.5%. A full breakdown of the method of travel to work across the areas is shown in Appendix 16.6.1, Table 2.1.13.

Household Accommodation

16.6.44 At the time of the Census there were 57,531 dwellings in the local area accommodating 57,560 household spaces[9] (ONS, 2011). Of these household spaces 98.0% were occupied (had at least one usual resident) and 2.0% were vacant. This is shown in Appendix 16.6.1, Table 2.1.14. This vacancy rate is lower than the labour market area (3.5%) and five authorities' area (4.3%), likely to be because the wider areas incorporate a number of areas where rates of second home ownership and buy-to-let accommodation are high (eg in coastal areas).

16.6.45 The local study area has a smaller housing stock compared with the labour market area and five authorities' area, reflecting the urban nature of Crawley and Horley. For example, 18.7% of homes are detached in the local study area compared with 24.7% in the labour market area and 28.0% in the five authorities' area. Similarly, 35.0% of homes in the local study area are terraced compared with 20.6% across the labour market and five authorities' areas. For flats, the proportion of homes which are purpose-built flats in the local study area is 20.7%, which is similar to the labour market area (20.0%) and higher than the five authorities' area. The local study area does however have significantly fewer flats which are part of a converted or shared house; just 1.1% of dwellings compared with 7.6% in the labour market area and 5.4% in the five authorities' area. This is because the wider areas incorporate a number of seaside towns and cities where the prevalence of flats which are part of converted houses is high.

16.6.46 Full details on dwellings, household spaces and accommodation type are shown in Appendix 16.6.1 Table 2.2.14.

Household Tenure

16.6.47 Reflective of its urban nature, origins as a New Town, younger age profile and smaller housing stock, the local study area has a higher proportion of households in the social rented tenure compared with the labour market area or five authorities' area; 20.4% compared with 13.2% and 12.7% respectively (this is shown in Appendix 16.6.1 Table 2.1.15). This proportion also exceeds the national average of 17.7% (ONS, 2011).

[9] Dwellings can accommodate more than one 'household space' (that is the accommodation available to one household to occupy) although this is generally rare, hence the number of dwellings and household spaces is broadly equal. In the local study area there were 9 dwellings with two household spaces (0.02% of dwellings) and 7 dwellings with 3 or more household spaces (0.01% of dwellings) as shown in Appendix 16.6.1 Table 2.1.12.

16.6.48 Consequently, there are fewer owner-occupier households in the local study area, representing 62.6% of households, although this is comparable with the national average of 63.3%. Rates of home ownership are higher in the labour market area (67.0%) and five authorities' area (68.7%).

16.6.49 Full details on household tenure can be found in Appendix 16.6.1 Table 2.1.15.

Household Composition

16.6.50 The local study area's younger population (shown in Appendix 16.6.1 Table 2.1.1) is reflected in its household profile with 17.6% of households being over age 65 (either single, couple or other household where all members are over 65) (ONS, 2011). This exceeds the national average of 20.7%. The labour market area and five authorities' areas have higher proportions of over 65 households than the national average (22.5% and 23.5% respectively) reflect the fact that they include many areas which are rural and/or coastal in nature where the demographic profile tends to be older.

16.6.51 Family households (one family households with children (of any age) and any other household with dependent children) are more prevalent in the local study area than either of the wider areas or the national average, representing 42.2% of households.

16.6.52 Full details on household composition can be found in Appendix 16.6.1 Table 2.1.16.

Business Profile

Enterprises by Section

16.6.53 In 2020, there were 6,035 enterprises in the local study area[10]; an increase of 540 (9.8%) since 2016 (ONS 2020g, see Appendix 16.6.1, Table 2.1.17). This is higher than growth in the number of enterprises seen in the labour market area and five authorities' area over the same period; 7.6% and 6.3% respectively. The rate of growth across all three areas was lower than the national average of 8.0%. The picture is similar when looking over the last 10 years, which shows overall growth of 29.7% in the number of enterprises in the labour market area and 25.9% in the five authorities area compared with 33.0% nationally.

16.6.54 Professional, scientific and technical enterprises represent the largest group in the local study area, representing 16.4% of enterprises, although this is lower than the labour market area (where they represent 18.9%) and five authorities' area (19.5%). In the latter areas this sector also represents the largest group. Outside professional services, the next largest group in the local study area is Construction, which represents 15% of all enterprises; a rate which is similar across the labour market and five authorities' areas.

16.6.55 Reflecting the nature of the local area (containing Gatwick Airport) and the occupation profile of residents the local study area has a high proportion of enterprises in the transport and storage sector; these represent 6.7% of all enterprises compared with 2.6% across the labour market area and 3.2% across the five authorities' area (see Appendix 16.6.1, Table 2.1.18). The local study area also has slightly fewer enterprises associated with agriculture, retail, Property and arts and recreation compared with the labour market and five authorities' areas.

16.6.56 Full details on enterprises can be found in Appendix 16.6.1 Tables 2.1.17 and 2.1.18.

[10] Based on a best-fit of MSOAs

Enterprises by Size

16.6.57 As of 2020 enterprises in the local study area were slightly larger than the labour market or five authorities' area, with 0.7% of enterprises with 250+ employees compared with 0.3% in both the labour market and five authorities' areas (ONS, 2020g). Similarly, for medium-sized enterprises (50 to 249 employees) the proportion in the local study area was 1.9% compared with 1.2%-1.3% in the labour market and five authorities' areas. Further details on enterprises by size is shown in Appendix 16.6.1, Table 2.1.19.

Enterprises by Turnover Band

16.6.58 The profile of enterprises in the labour market area was slightly smaller, in terms of turnover, compared with the five authorities' area. In 2020 the percentage of enterprises with an annual turnover of over £500,000 in the labour market area was 14.9% whilst in the five authorities' area this was slightly higher, at 15.9% (ONS, 2020g, see Appendix 16.6.1, Table 2.1.20). Similarly, the proportion of enterprises with a turnover of £5m+ was 1.8% in the labour market are compared with 2.1% in the five authorities' area. Further details on enterprises by turnover is shown in Appendix 16.6.1, Table 2.1.20.

Community Facilities

16.6.59 This section describes the existing provision of social and community infrastructure within the local study area, to help understand the potential effect on facilities in this area and the people who use them that could result from any displacement or change associated with the Project.

16.6.60 Community facilities within the local study area are set out in Figures 16.6.9 to 16.6.13.

Early Years Education

16.6.61 Data from the Department for Education school information portal (DfE, 2021) indicates that there are 22 early years care providers within the local study area. This comprises nine children and family centres, 11 primary schools (which provide education from ages 2 or 3 years), one community special school (Manor Green Primary School) and one independent school (Copthorne Preparatory School). These are shown in Figure 16.6.9 and Appendix 16.6.1, Table 2.1.21.

Primary Education

16.6.62 There are currently 37 primary schools within the local study area (DfE, 2021), which are a mixture of local-authority maintained, academies and free schools. These are shown in Figure 16.6.9. The 35 schools which have current information on capacity and enrolment have a combined capacity of 13,652 and combined enrolment of 13,241 pupils, indicating a surplus of 411 spaces. The two schools which do not have information on current enrolment (Milton Mount Primary School and Westvale Park Academy) have a combined capacity for a further 1,102 pupils. This is shown in Appendix 16.6.1, Table 2.1.22.

Secondary Education

16.6.63 There are currently seven state-funded secondary schools within the local study area (DfE, 2021) which are shown in Figure 16.6.9. These are a mixture of local authority maintained schools and academies. One school – Oakwood School – provides education for ages 11-16 only (Key Stages 3 and 4) and all of the remaining schools provide education for ages 11-18. Collectively, all

secondary schools in the local study area have a combined capacity for 9,754 pupils and 8,663 pupils currently enrolled. This indicates a surplus of 1,091 spaces, as shown in Appendix 16.6.1, Table 2.1.23.

Post-16 Education Providers

16.6.64 In addition to post-16 education which is offered at six secondary schools in the local area, Crawley College is the other post-16 education providers in the local area and is shown in Figure 16.6.9. Crawley College offers T Levels (replacements for A Levels), apprenticeships, some forms of higher education (eg higher national diploma, in partnership with other colleges across Sussex), adult education, short courses and professional courses. This is shown in Appendix 16.6.1, Table 2.1.24.

Other Schools

16.6.65 In addition to the schools described above there are a number of further schools in the local study area (DfE, 2021) as follows.

- The Gatwick School – an all-through Free School for ages 4-16. It has capacity for 1,020 pupils with 761 pupils enrolled, indicating a surplus of 259 spaces.
- Manor Green Primary School (ages 2-11) and Manor Green College (ages 11-19), both community special schools. Manor Green College is currently operating at capacity with 215 pupils enrolled compared with capacity of 213. The capacity of Manor Green Primary School is unknown however there are currently 211 pupils enrolled.
- Aurora Redehall School (ages 6-19) – an independent special school. This is also operating at capacity with 44 pupils.
- Atelier 21 Future School (ages 4-14) – an independent school with capacity for 120 pupils (enrolment unknown).
- Copthorne Preparatory School (ages 2-13) – an independent school with boarding facilities. This currently has 352 pupils enrolled against capacity of 360.

16.6.66 These schools are shown in Figure 16.6.9 and further details are given in Appendix 16.6.1 Table 2.1.25.

Primary Healthcare

16.6.67 There are 15 General Practitioner's (GP) surgery groups within the local study area, three of which contain twinned surgeries making 18 surgeries in total, all providing primary care (NHS, 2021) (Figure 16.6.10). These surgeries contain a total of 93 full-time equivalent (FTE) GPs and 166,672 registered patients as set out in Appendix 16.6.1, Table 2.1.26 (NHS, 2020). This indicates a ratio of 1,783 registered patients per FTE GP, which is in line with the current national average of 1,782 registered patients per GP (NHS, 2020).

Dental Care

16.6.68 There are 18 dental practices in the local study area providing a range of dental care and services (Figure 16.6.10 and Appendix 16.6.1, Table 2.1.27), plus the Urgent Treatment Centre at Crawley Hospital which provides urgent dental care (NHS, 2021). Because of the impacts of restrictions associated with the recent Covid-19 pandemic many of these dentists have not indicated (via the NHS website) whether or not they are accepting new patients; whilst dentists are open at present it is possible that dentists will be limiting registration of new patients whilst they work through the backlog of appointments caused by Covid-19 restrictions.

Secondary Healthcare

16.6.69 There are four hospitals located within the local study area (NHS, 2021) (Figure 16.6.11 and Appendix 16.6.1, Table 2.1.28). These are as follows.

- Crawley Hospital – an NHS hospital run by Sussex Community NHS Trust. It has an Urgent Treatment Centre (UTC) which provides care for urgent but non-life threatening injuries (eg sprains and strains, broken bones, minor burns and scalds, minor head and eye injuries, bites and stings) but no Accident and Emergency (A&E) department.
- Langley Green Hospital – an NHS hospital for those with acute mental health illnesses run by Sussex Partnership NHS Foundation Trust. No A&E department.
- Farmfield Hospital – a private secure hospital run by Elysium Healthcare for the treatment of adult males with severe mental health illnesses.
- Spire Gatwick Hospital – a private hospital run by Spire Healthcare Network treating both NHS referrals and private patients across a range of areas. No A&E department.

16.6.70 The nearest hospital with an A&E department is East Surrey Hospital which is located just over four miles to the north of Gatwick Airport in the south of Redhill.

Emergency Services

16.6.71 Fire services in the local study area are provided by Crawley Fire Station (West Sussex Fire Service) and Gatwick Airport Fire and Rescue Service (NFCC, 2021) (Figure 16.6.11 and Appendix 16.6.1, Table 2.1.29). Gatwick Airport Fire and Rescue Service incorporates a training centre and a further training centre is located at Horley Fire Station (which is a training centre only).

16.6.72 Police services in the local study area are provided by Sussex and Surrey Police Forces. Sussex Police are based at Crawley Police Station and Gatwick Police Station, the latter also having British Transport Police (Police UK, 2021) (Figure 16.6.11 and Appendix 16.6.1, Table 2.1.29).

Community Spaces

16.6.73 There are 17 Community Spaces within the local study area (CBC, 2021b) (see Figure 16.6.11 and Appendix 16.6.1, Table 2.1.30). These serve a range of functions and include local community-owned or operated community centres and public halls, halls or centres owned by or connected to places of worship and halls connected to local Scout or Brownie clubs. These are used for a wide range of community activities, including food bank provision and nurseries during certain hours.

Places of Worship

16.6.74 There are currently 29 places of worship and faith centres within the local study area. These comprise 19 Christian Churches, three Islamic Mosques or Centres, three Hindu Temples, one Sikh Gurdwara, two spiritualist churches and one multi-denominational chapel (in Gatwick Airport) (Yell, 2021) (see Figure 16.6.11 and Appendix 16.6.1, Table 2.1.31).

Libraries

16.6.75 Local public libraries are statutory services provided and managed by local authorities. In the case of the local study area this comprises three libraries: Crawley Library and Broadfield Library (both located in Crawley and provided by West Sussex County Council) and Horley Library

(provided by Surrey County Council). These are shown in Figure 16.6.11 and Appendix 16.6.1, Table 2.1.32) (Surrey County Council, 2021 and West Sussex County Council, 2021). These libraries provide a range of services including book and multimedia collections, study space and publicly accessible computers. Some libraries also provide space for adult learning classes provided by local authorities, offering a range of qualifications and classes for employment or for leisure.

Sports and Open Space

Sports, Leisure and Recreation

16.6.76 There are three sports facilities within the Project site boundary, all of which have health and fitness suites (Figure 16.6.12). These are within the Airport at the Sofitel London Gatwick, Living Well Express Club and Courtyard Marriott (London Gatwick Airport).

16.6.77 There are a wide range of sports facilities within the local study area which include both built facilities such as sport centres, indoor swimming pools and gyms, as well as open and green space with a formal or informal outdoor sports function, such as football pitches, school playing fields, recreation grounds, tennis courts, bowling greens and golf courses (Figure 16.6.12). These are a mixture of local authority run and privately run. In total, there are 211 locations that provide sports facilities within the local study area including 105 with grass pitches, 26 with sports halls and 18 with health and fitness suites (Appendix 16.6.1, Table 2.1.33).

Open Spaces

16.6.78 The distribution of open spaces, including public parks and gardens, within the local study area is shown in Figure 16.6.13 and Table 2.1.34 of Appendix 16.6.1.

16.6.79 There are two open spaces within the Project Site Boundary: St. Bartholomew's Church Grounds to the north of the A23 (1.2ha) and a tennis court located in Buckingham Gate car park. In addition, a small part of the Riverside Garden Park (c.0.75ha) falls within the site boundary (just north of the A23). The Riverside Garden Park has been identified in the Reigate and Banstead Borough Council (2018) Urban Open Space Assessment and Review as an urban open space of high value (Reigate and Banstead Borough Council, 2018).

16.6.80 A total of 217 designated open space are identified within the local study area, providing approximately 543.7 hectares of open space, as shown in Table 2.1.34 of Appendix 16.6.1.

16.6.81 Further details on the open space in the area are provided in Chapter 18: Agricultural Land Use and Recreation.

Play Spaces

16.6.82 There are 111 play spaces located within the local study area providing a total of 8.4 hectares of space. The play spaces incorporate a mix of informal play areas and formal play equipment (see Figure 16.6.13 and Table 2.1.34 of Appendix 16.6.1).

Allotments

16.6.83 There are 24 publicly maintained allotment sites or community growing spaces within the local study area, totalling approximately 14.3 hectares (see Figure 16.6.13 and Table 2.1.34 of Appendix 16.6.1). Allotment use is usually managed by the local authorities (with the majority of

allotments in the local study area being managed by Crawley Borough Council), with plots allocated to residents using a waiting list system.

Housing Market Conditions

House Prices

16.6.84 The average median price of dwellings sold in the local study area in the year to September 2020 was £319,098 (ONS, 2020d), representing an increase of 20% over the last 5 years (2015-20) and 53% over the last 10 years (2010-20) (see and Appendix 16.6.1 Table 2.1.35). The most expensive parts of the local study area are in Horley, the east of Crawley and in the rural areas around Copthorne and Ifieldwood, as shown in Figure 16.6.14. With median house prices of £295,000 as of 2020, Crawley represents one of the least expensive districts in the labour market area, along with Arun (£287,500) and Eastbourne (£250,000), as shown in Figure 16.6.14. The most expensive parts of the labour market area are all in Surrey; Mole Valley (the most expensive at £516,500), Tandridge (£440,000) and Reigate and Banstead (£425,000).

16.6.85 Growth in house prices in the local study area has outpaced growth at a national level, where house prices have increased 19% in the last 5 years and 38% in the last 10 years. Prices in the local study area are currently 28% higher than the national average of £249,000; this is an increase since 2010 when local study area house prices were only 16% higher than the national average. Despite being one of the least expensive authorities in the labour market area, house prices in Crawley have increased amongst the fastest over the last 10 years as shown in Figure 16.6.6. House prices in Crawley increased by 64% between 2010 and 2020, compared with an increase of 30-60% seen across most of the remaining authorities in the labour market area.

16.6.86 House prices in the five authorities' area vary widely between authorities (and even further within authorities), ranging from £230,000 in Hastings to £600,000 in Elmbridge. With average prices of £319,098 the local study area has slightly higher average prices than Crawley (£295,000) due to the inclusion of some parts of Surrey in the local study area where house prices are substantially higher. Crawley would rank broadly amongst the middle of the 37 authorities in question.

16.6.87 Average median house prices of the authorities in the labour market area currently stand at £351,196, more expensive than the local study area. However, the rates of increase in the labour market area are broadly similar to those seen across the local study area (22% over 5 years and 52% over 10 years). Prices in the five authorities' area are even higher at £357,895, representing an increase of 24% over 5 years and 54% over 10 years. The key authorities driving growth in house prices over the last 5 years have been coastal areas where housing is typically less expensive (for example the top three areas in terms of house price growth are Thanet, which has seen a 38% increase in prices to £247,725 in 2020, Hastings which has seen a 37% increase to £230,000 and Folkestone and Hythe which has seen a 33% increase to £265,000). The most expensive authorities are in Surrey; Elmbridge (£600,000), Mole Valley (£516,500), Epsom and Ewell (£485,000) and Waverley (£480,000).

16.6.88 Full details on house prices can be found in Appendix 16.6.1, Table 2.1.35.

Affordability

16.6.89 All local authority areas in the labour market and five authorities' areas, with the exception of Dover, are less affordable than the national average as of 2020 (ONS, 2020e) (see Appendix 16.6.1, Table 2.1.36). The average workplace-based affordability ratio (house prices to workplace

earnings) across the authorities in the labour market and five authorities' areas is 11.5 compared with the national average of 7.8. This represents a 26.7% increase in the labour market area over the last 10 years and a 29.1% increase in the five authorities' area, compared with the national increase of 14.5%. The least affordable areas reflect those where house prices are high (Waverley, Elmbridge, Epsom and Ewell) however also includes areas where house prices are not as expensive but where workplace earnings are lower (such as Horsham).

16.6.90 Overall resident-based affordability (the ratio of house prices to the earnings of those living in a district) across the labour market area is 10.6 and in the five authorities' area 10.4. Resident-based affordability for the authorities in the labour market area is shown in Figure 16.6.17. Reflecting the fact that local workplace earnings are lower than resident earnings, the affordability ratios further indicate that residents in the labour market and five authorities' areas commute out to better paid jobs elsewhere. This makes housing relatively more affordable to people who live in the authorities when compared with those who work there (as shown by the workplace affordability ratio, which is higher than the resident-based ratio).

16.6.91 Crawley is amongst the most affordable local authorities in the labour market and five authorities' area with house prices 8.16 times workplace earnings and 9.4 times resident earnings, albeit is still less affordable than the national average. This is partly a reflection of the urban nature of the local authority, having a smaller housing stock (with a high proportion of flats and smaller houses) in turn reflected in lower house prices. Crawley is also only one of six authorities[11] in the labour market/five authorities' areas where resident affordability is worse than workplace affordability, indicative that people commute into Crawley where jobs are better paid relatively to the surrounding area. This is likely to be, at least in part, a reflection of the skilled jobs on offer at Gatwick Airport.

16.6.92 Table 2.1.36 of Appendix 16.6.1 shows resident and workplace affordability ratios for all local authorities in the labour market area and five authorities' area in 2010 and 2020 along with the change over this time period.

16.6.93 Data published by ONS in 2020 (ONS, 2020e) provides a sub-district picture of affordability (down to MSOA level) although this is not directly comparable with local authority level data as it is based on net household income (rather than gross). This shows that within the local study area the least affordable areas are the rural areas, particularly around Copthorne and Charlwood, where median house prices are in excess of 12 times median (net) annual earnings as of 2018, as shown in Figure 16.6.17 of Appendix 16.6.1 and Table 2.1.37 of Appendix 16.6.1. The most affordable parts of the local study area are in Crawley town centre, due in part to the fact that homes here are smaller (compared with rural areas) and therefore housing is less expensive.

Supply

16.6.94 Relative to the national average, housing supply has increased slightly faster in the labour market area and slightly slower in the five authorities' areas over the last 10 years. As of 2019 there are 918,755 dwellings in the labour market areas, representing a 7.8% increase over the last 10 years (0.78% per year). By comparison there are 1,945,531 dwellings in the five authorities' area representing a 7.5% increase over the last 10 years (0.75% per year). Over the same period the

[11] The other authorities being Dover (workplace ratio 7.0, resident based 7.3), Gravesham (8.4, 9.8), Reigate and Banstead (14.7, 16.8), Runnymede (9.9, 11.1) and Worthing (9.5, 9.7)

national rate of housing growth was 7.6% (0.76% per year) (MHCLG 2019b) (see Appendix 16.6.1 Table 2.1.38).

16.6.95 The authorities in the labour market and five authorities' areas which have grown the fastest in the last 10 years are Dartford (1.64% per year on average), Horsham (1.36%), Maidstone (1.26%0 and Ashford (1.20%). The slowest growing authorities were Brighton and Hove (0.35%), Adur (0.37%), Eastbourne (0.41%) and Rother (0.46%); these are generally urban, under-bounded and highly constrained authorities.

16.6.96 Full details of housing stock in the labour market and five authorities' areas over the last 10 years are shown in Appendix 16.6.1, Table 2.1.38.

Future Baseline Conditions

16.6.97 A key determinant of future socio-economic baseline conditions will be the changes in population levels, subsequent change in labour supply and associated job change. Data on these indicators have been compiled for the labour market area[12] as the most applicable study area for determining a number of related socio-economic effects. Further details on the methodology can be found in Appendix 16.6.2, Section 1 and details of the inputs in Appendix 16.6.2, Annex 1.

Projected Change Based on Demographic Trends

16.6.98 The future baseline has been assessed using the latest ONS SNPPs (ONS, 2018b), re-based to account for the latest 2019 MYEs (by Lichfields (Appendix 16.6.2), using PopGroup demographic modelling software). ONS SNPPs are demographic-led projections which project future change in population based on recent trends in births, deaths and migration. From this population projection and estimate of the labour supply can be generated (by applying economic activity rates to the population) which in turn can estimate the number of jobs supported (by applying rates of unemployment and commuting). This population can also be translated into a number of homes, through applying rates of household formation along with assumptions around dwelling vacancy rates. All demographic-led scenarios assessed are set out in Appendix 16.6.2, Section 2.0.

16.6.99 On the basis of the latest SNPPs it is anticipated that the population of the labour market area will increase from 2,113,056 as in 2019 to 2,214,602 in 2038 (an increase of 101,546 people), based on official projections. This is shown in Table 16.6.1 below. Taking into account rates of economic activity, this would be expected to support growth in the labour supply of 54,886 (increasing from 1,126,462 in 2019 to 1,181,348 in 2038). Based on this labour supply, and taking into account rates of unemployment and commuting, this would be expected to support an increase of 50,724 jobs (from 1,055,377 in 2019 to 1,106,101 in 2038). This population would generate a need for an additional 97,631 homes over the 2019-38 period.

16.6.100 This increase in jobs does not reflect any economic forecasts; the number of jobs is an outcome of the modelling based on the projected population growth, taking into account economic activity rates, unemployment and commuting patterns.

[12] Note that the definition of the labour market area is different to the 'study area' used in Appendix 16.6.2 Assessment of Population and Housing Effects and therefore figures are not directly comparable. This is because the study area in 16.6.2 includes any authorities which overlap into housing market areas which fall within the labour market area. Therefore the study area used in Appendix 16.6.2 include all authorities in the labour market area as well as Chichester, Elmbridge and Epsom and Ewell (17 authorities in total).

Table 16.6.1: Projected Total Population, Labour Supply, Jobs and Dwellings in the Labour Market Area (based on latest population projections)

	2019	2024	2029	2032	2038	2019-38 change
Population	**2,113,056**	**2,147,866**	**2,171,935**	**2,185,339**	**2,214,602**	**101,546**
Labour Supply	1,126,462	1,145,641	1,163,866	1,168,722	1,181,348	54,886
Jobs	1,055,377	1,072,421	1,089,832	1,094,519	1,106,101	50,724
Dwellings	919,691	945,618	972,330	987,718	1,017,322	97,631

Source: Lichfields analysis using PopGroup. Refer to Appendix 16.6.1, Tables 2.1.39-42 for Labour Market Area outputs for each year. See Appendix 16.6.2, Annex Table A3.3 for headline outputs (2019 and 2038) for all individual local authorities in the population and housing **study area** – note that the study area is slightly larger than the Labour Market Area (for the reasons set out in Appendix 16.6.2 para 1.2.1-2) and therefore figures (for population, labour supply, jobs and dwellings) for the study area shown in Appendix 16.6.2 are higher than the Labour Market Area because more authorities are included.

16.6.101 The growth in population is anticipated to be 4.81% over the 2019-38 period, with growth of 4.87% in the labour supply (owing to increases in economic activity amongst older people) and growth of 4.81% in the number of jobs, as shown in Table 16.6.2 below.

Table 16.6.2: Percentage Change in Population, Labour Supply and Jobs in Labour Market Area for each Assessment Period (from base date of 2019)

	2019-24	2019-29	2019-32	2019-38
Population	**1.65%**	**2.79%**	**3.42%**	**4.81%**
Labour Supply	1.70%	3.32%	3.75%	4.87%
Jobs	1.62%	3.26%	3.71%	4.81%
Dwellings	2.82%	5.72%	7.40%	10.62%

Source: Lichfields analysis using PopGroup (Appendix 16.6.2)

16.6.102 Annual growth in population, labour supply and jobs are anticipated to be slightly higher in the first five years of the projection period (2019-24), slowly slightly in 2024-29 and in 2029-32, before picking up slightly in the 2032-38 period, as shown in Table 16.6.3 below.

Table 16.6.3: Annual Percentage Change in Population, Labour Supply and Jobs in Labour Market Area for each Assessment Period

	2019-24	2024-29	2029-32	2032-38
Population	**0.33%**	**0.22%**	**0.21%**	**0.22%**
Labour Supply	0.34%	0.32%	0.14%	0.18%
Jobs	0.32%	0.32%	0.14%	0.18%
Dwellings	0.56%	0.56%	0.53%	0.50%

Source: Lichfields analysis using PopGroup (Appendix 16.6.2)

Projected Change Based on Planned Housing Numbers

16.6.103 As set out above, demographic projections are primarily driven by past trends in births, deaths and migration. In such scenarios, the number of jobs supported, and number of homes needed are outcomes of the modelling (resulting from the level of population growth inputted). However, population change does not occur in isolation; it can be driven by external factors such as the availability of housing and demand for labour (ie forecast job growth).

16.6.104 In determining the impacts of the Project, it is important to consider not only projected population growth based on demographic projections, but what level of population growth is likely to occur based on known factors, such as planned housing growth levels. Therefore, we have also assessed future change (in terms of population, labour supply and jobs) based on planned housing numbers.

16.6.105 In these scenarios, the amount of housing growth is the driver of future change, dictating the level of population growth and in turn the labour supply. Again, in such scenarios, the number of jobs supported is an output of the modelling and does not reflect any economic forecasts, such as those produced by CE. Full details of all housing-led scenarios assessed for the study area are given in Section 4 of Appendix 16.6.2.

16.6.106 Based on anticipated housing growth, as set out in each local authorities' current housing trajectory[13] we would expect a total of 172,447 homes to be delivered in the labour market area between 2019 and 2038. Based on this level of housing growth, projected population growth in the labour market area is 277,560 as shown in Table 16.6.4 below. This would generate a labour supply of 156,576 and support 139,259 jobs.

Table 16.6.4: Projected Total Population, Labour Supply and Jobs in the Labour Market Area (based on planned housing numbers)

	2019	2024	2029	2032	2038	2019-38 change
Dwellings	**919,691**	**972,796**	**1,017,300**	**1,040,786**	**1,092,138**	**172,447**
Population	2,113,056	2,219,265	2,283,188	2,313,602	2,390,616	277,560
Labour Supply	1,126,462	1,190,365	1,230,636	1,244,067	1,282,938	156,476
Jobs	1,055,377	1,112,188	1,148,965	1,160,634	1,194,636	139,259

Source: Lichfields analysis using PopGroup. Refer to Appendix 16.6.1 Tables 2.1.43-46 for labour market outputs for each year and Appendix 16.6.2 Annex Table A3.9 for headline outputs (2019 and 2038) for population, labour supply, jobs and housing for all individual local authorities in the study area.

Projected Change Based on Economic Forecasts

16.6.107 Economic forecasts produced by forecasting houses (such as CE, which form the basis of the economic analysis for the Project) are prepared on the basis of forecasts and assumptions around wider macro-economic trends (at a regional, national and international level). Whilst the forecasts do not account for specific projects or investments, they do reflect wider factors, for example the most recent March 2021 forecasts reflect the expected impact of the Covid-19 pandemic on national economic growth and the terms of the recent Brexit agreement set out in December 2019. CE's full note accompanying its most recent forecasts (which sets out its assumptions regarding these factors) is included at Appendix 16.6.2, Annex 5.

16.6.108 For the labour market area CE data indicates there were 1,055,377 jobs in 2019 (see Table 2.1.10 of Appendix 16.6.1). This is different from the total number of jobs reported in ONS BRES (ONS, 2020c) data due to the different methodologies used by each organisation. However, this assessment has adopted the CE data for the purposes of consistency with job figures/forecasts quoted elsewhere. CE forecasts that by 2038 there will be 1,108,348 jobs in the labour market

[13] For the reasons set out in Appendix 16.6.2 paragraphs 4.3.2-9 this is considered a 'worst-case scenario' because as plans are updated across the study area they will be prepared in line with the 2019 NPPF which requires authorities to adopt the 'standard method' for assessing housing need. This generates around 17,000 homes per annum in the long-term across the study area compared with around 10,000 homes per annum based on current trajectories. Actual completions are used for the 2019/20 year.

area; an increase of 52,971 compared with 2019[14]. Taking into account commuting patterns this would require labour supply growth of 60,434 which would require population growth of 105,472. This population would generate a need for 95,113 dwellings, as shown in Table 16.6.5.

Table 16.6.5: Projected Labour Supply, Population and Dwellings in the Labour Market Area (based on jobs forecast by CE)

	2019	2024	2029	2032	2038	2019-38 change
Jobs	**1,055,377**	**1,052,286**	**1,073,731**	**1,085,659**	**1,108,348**	**52,971**
Labour force	1,126,462	1,126,430	1,149,544	1,162,415	1,186,896	60,434
Population	2,113,056	2,114,093	2,143,326	2,168,809	2,218,528	105,472
Dwellings	919,691	930,342	957,764	977,345	1,014,803	95,113

Source: Lichfields analysis using PopGroup. Refer to Appendix 16.6.1 Tables 2.1.47-50 for labour market outputs for each year and Appendix 16.6.2 Annex Table A3.5 for headline outputs (2019 and 2038) for population, labour supply, jobs and housing for all individual local authorities in the study area. Note: This scenario produces a lower dwelling need figure compared with the scenario based on the latest official projections (shown in Table 16.6.1) because this scenario constrains/inflates migrations as required to achieve the labour supply needed to support the inputted level of job growth (from CE). This results in changes to the age profile of the area which affects the number of households and therefore dwelling need.

Future Baseline – Summary

16.6.109 There is no single scenario which accurately represents future population, housing and job growth in the labour market area. Projections or forecasts exist for each element from different sources and are often prepared without full and complete regard of the others. In this context, Appendix 16.6.2 tests a range of future scenarios which are either demographic-led (where population projections dictate labour supply, job growth and housing need), housing-led (where the number of homes delivered dictates population growth, which in turn dictates labour supply and job growth) and jobs-led (where the number of jobs dictates population growth and subsequently housing need).

16.6.110 A comparison of population, labour supply, jobs and dwellings under the three scenarios described above is shown below in Table 16.6.6. This shows that the level of population growth projected based on the latest official projections is expected (based on economic activity, unemployment and commuting assumptions) to support an increase of 50,724 jobs in the labour market area between 2019 and 2038. Separately, the current housing trajectories would be expected to support population growth of 277,560 which would generate labour supply of 156,476 and support 139,529 jobs. Finally, CE forecast an increase of 52,971 jobs in the labour market area between 2019 and 2038, which is modelled to require labour supply growth of 60,434 people which would in turn require a population growth of 105,472 people.

[14] As CE forecasts only have a horizon to 2036, figures for 2037 and 2038 have been obtained by trending the change in jobs seen in 2035-36.

Table 16.6.6: Summary of Future Scenarios – 2019-38 Change

	Population projections (demographic-led)	Anticipated housing delivery (housing-led)	CE forecasts (jobs-led)
Population	101,546	**277,560**	105,472
Labour Supply	54,886	**156,476**	60,434
Jobs	50,724	**139,259**	52,971

Source: Lichfields analysis using PopGroup (Appendix 16.6.2)

16.6.111 Therefore, the analysis shows that:

- the labour supply generated by population projections would not support the number of jobs forecast by CE (albeit this shortfall is relatively small at 4%);
- however, the number of homes which are expected to be provided in the labour market area is likely to generate a population which exceeds that set out in the latest official population projections;
- in turn, this larger population would generate a larger labour supply than that anticipated based on the latest official projections; and
- this means that the number of jobs support based on planned housing growth exceeds the number of jobs likely to be supported based on population projections as well as the number of jobs forecast by CE.

16.6.112 Therefore, for the purposes of the future baseline, we have adopted the future change based on the housing-led scenario (anticipated delivery based on current housing trajectories), which is shown in Table 16.6.4 above (and summarised in Table 16.6.6). This reflects the approach adopted in Appendix 16.6.2, in which the labour supply generated based on current housing trajectories is compared with the labour supply, which is needed to support growth forecast by CE, in order to identify, if any, the population and housing impacts of the Project (for further information see Appendix 16.6.2, Section 5.0).

16.7. Key Project Parameters

16.7.1 The assessment has been based on the parameters identified within Chapter 5: Project Description.

16.7.2 Table 16.7.1 below identifies the key parameters relevant to this assessment. Where options exist, the maximum design scenario selected is the one having the potential to result in the greatest effect on an identified receptor or receptor group. Effects of greater adverse significance are not predicted to arise should any other option identified in Chapter 5 be taken forward in the final design of the Project.

Table 16.7.1: Maximum Design Scenarios

Potential Impact	Maximum Design Scenario	Justification
Initial Construction Phase: 2024-2029		
Construction Effects		
Change in construction employment and supply chain activity, resident disruption	The construction workforce will peak between October 2026 and February 2027 when the expected average daily figure is 1,185 workers. The peak figure across the period is 1,303 workers per day in October 2026.	These are the estimated peak maximum numbers of construction workers required for completing the Project.
Disruption to businesses and residents	Establishment of the main contractor construction compound, airfield satellite contractor compound and South and North Terminal surface access satellite contractor compounds.	The periods the contractor compounds will be in place represents the maximum time allowance during the initial construction phase.
First Full Year of Opening: 2029		
Construction Effects (2030-2032)		
Change in construction employment and supply chain activity, resident disruption	The construction workforce will peak at 880 workers in March 2029. Between January 2029 and June 2031, the average workforce per day will be around 750 workers. This will decrease to 340 for the rest of the period, resulting in an average figure for the entire phase of 595 workers.	This is the estimated peak maximum numbers of construction workers required for completing this phase of the Project.
Disruption to businesses and residents	All the above construction compounds (ie main contractor construction compound, airfield satellite contractor compound and South and North Terminal surface access satellite contractor compounds will continue operating during this phase. In addition, the Longbridge roundabout satellite contractor compound will be established in 2030.	The periods the contractor compounds will be in place represents the maximum time allowance between 2029 and 2032.
Disruption to businesses and residents	Improvements works to the South and North Terminal roundabouts, together with works at Longbridge roundabout	The construction access period is the maximum required for completing the improvements.

Potential Impact	Maximum Design Scenario	Justification
	will be commenced in 2029 and expected to be completed in 2032.	
Disruption to adjacent open space	Improvements to the North Terminal Roundabout beginning in 2029 might affect the Riverside Garden Park (c.0.75ha); however, a noise barrier up to two metres in height would be located on a section adjacent to the park. In addition, replacement open space (ie of an around one hectare (or an area equivalent to the total loss of public open space) of land immediately to the west of the London to Brighton railway line (north of the current A23) has been identified to replace any loss that could be created by the roundabout works.	This option would represent the maximum land take and area of disruption, as it might require widening of the highway into the adjacent Riverside Garden Park.
Operational Effects		
Change in operational direct, indirect and catalytic employment	Direct, indirect and catalytic employment will increase by 1,000, 1,900 and 3,800 jobs respectively within the UK.	This represents the maximum increase in direct, indirect and catalytic employment in the ICF employment forecasts and Economic Impact Report (Oxera, 2021).
Interim Assessment Year: 2032		
Construction Effects (2033-2038)		
Change in construction employment and supply chain activity, resident disruption	The construction workforce will peak at around 380 workers between 2032 and 2037.	This is the estimated peak maximum numbers of construction workers required for completing the Project.
Disruption to businesses and residents	The South Terminal and North Terminal surface access satellite contractor compounds will remain in place up to 2031, with the main contractor compound remaining until 2035.	The periods the contractor compounds will be emplaced represents the maximum time allowance between 2029 and 2037.
Operational Effects		
Change in operational direct, indirect and catalytic employment	Direct, indirect and catalytic employment will increase by 3,200, 6,100 and 11,600 jobs respectively within the UK.	This represents the maximum increase in direct, indirect and catalytic employment in the ICF employment forecasts and Economic Impact Report (Oxera, 2021).

Potential Impact	Maximum Design Scenario	Justification
Design Year: 2038		
Operational Effects		
Change in operational direct, indirect and catalytic employment	Direct, indirect and catalytic employment will increase by 3,200, 6,300 and 10,800 within the UK.	This represents the maximum increase in direct, indirect and catalytic employment in the ICF employment forecasts and Economic Impact Report (Oxera, 2021).

16.8. Mitigation and Enhancement Measures Adopted as Part of the Project

16.8.1 A number of measures have been designed into the Project to reduce the potential for socio-economic impacts and enhance the potential benefits. These are listed in Table 16.8.1.

Table 16.8.1: Mitigation and Enhancement Measures

Measures Adopted as Part of the Project	Reason
Construction Mitigation	
Code of construction practice	A Code of Construction Practice (CoCP) will be produced to ensure construction contractors and processes follow practices that minimise adverse effects associated with the construction of the Project. Measures proposed include: ▪ Construction traffic management. ▪ Set hours of working. ▪ Alternative vehicle access routes. ▪ A code of conduct for construction workers. ▪ Engagement processes to keep the local community up to date. ▪ Travel plan. An outline CoCP is provided at Appendix 5.3.1.
Investing in the community through the Gatwick Airport Community Fund and related initiatives	Investing in the community through the current Gatwick funds could help provide funding for measures in those areas most impacted by the Project during construction.
Providing compensation to affected stakeholders	Providing compensation to adversely affected stakeholders will help potentially mitigate effects such as business displacement and the viability of community facilities and services during construction.
Operational Mitigation	
Investing in the community through the Gatwick Foundation fund and related initiatives	Investing in the community through the current Gatwick funds could help provide funding for measures in those areas most impacted by the Project during operation.

Measures Adopted as Part of the Project	Reason
Monitoring	
No monitoring measures are proposed in relation to socio-economic receptors	
Enhancement	
Implementation of an Outline Employment, Skills and Business Strategy	The Project will include the adoption of an Outline Employment, Skills and Business Strategy to continue and expand activities undertaken by Gatwick Airport Limited to support career entry (for graduates and apprenticeships), training and other work opportunities, together with the adoption of a Business Support Strategy to link Gatwick with providers in the supply chain and through local procurement initiatives. These measures will enhance the potential employment and labour market impacts of the Project.

16.9. Assessment of Effects

Initial Construction Phase: 2024-2029

Construction 2024 to 2029

Employment

16.9.1 In 2019, there were 5,000, 75,977 and 177,082 construction jobs in the local study area, labour market area and five authorities' area, respectively (ONS, 2020c and CE, 2021). This equates to 4.5%, 7.2% and 7.6% of total jobs in each respective area, which indicates the construction sector was a more important part of the economy in the labour market and five authorities' areas than the local study area. The proportion of all enterprises which were in the construction industry is similar across the local study area (15.0%), the labour market area (14.2%) and five authorities' area (14.0%) suggesting that enterprises in the construction sector in the local area are smaller (in terms of employee count) (ONS, 2020g). The national equivalent is below those reported in the impact areas at 12.8% (ONS, 2020g).

16.9.2 Considering the scale of the construction sector in the local study area economy, the sensitivity of the receptor is judged to be medium. The sensitivity of the construction sector in the labour market area and five authorities' area is judged to be low due to the larger scale of the sector and a higher proportion of businesses engaged in construction activity than at a national level.

16.9.3 Construction employment for the Project would increase from around 450 workers at the start of 2024 to approximately 1,300 workers in October 2026. The number of construction workers would then decrease over the initial construction phase to around 820 workers. The number of construction workers would considerably increase the size of the construction workforce within the local study area while having less of an impact at the wider labour market area and five authorities' area.

16.9.4 The peak workforce (ie approximately 1,300 workers) in the initial construction phase is equivalent to 26.0%, 1.7% and 0.7% of the size of the construction workforce in the local study

area, labour market area and five authorities area, respectively. Therefore, the magnitudes of impact in the study areas are considered as high, low and low, respectively. This would result in a significant, temporary, medium-term, **moderate to major beneficial** effect in the local study area and non-significant, temporary, medium-term, **minor beneficial** effects in the labour market and five authorities' areas.

Supply Chain

16.9.5 Job estimations related to the construction supply chain have not been included in the Economic Impact Report (Oxera, 2021) due to the temporary nature of the activity and considerable fluctuations in the size of the workforce across short time periods, and the higher level of variability in potential supply chain dynamics compared to relatively fixed dynamics associated with direct operational employment. However, considering the large scale of the construction workforce in the initial construction phase, there would be likely to be a sizeable impact on the construction supply chain.

16.9.6 Construction jobs make up a small percentage of jobs in the local area (5,000, representing 4.5% of jobs) (ONS, 2020c) however the area has a comparable proportion of enterprises in the construction sector (at 15.0%) to wider averages (ONS, 2020g). Therefore, the sensitivity of the local supply chain is considered to be medium due to the number of firms that could potentially benefit from the scale of construction activity expected, and the specialist nature of some of the construction services required for the Project. The sensitivity of the construction supply chain in the labour market area and five authorities' area is judged to be low considering the scale of the construction business base compared to the local study area.

16.9.7 The magnitude of impact within the local study area is judged to be low as it is likely the small number of enterprises would only capture some of the additional supply chain activity. The magnitude of impact is also considered as low in the labour market area and five authorities' area proportionate to the scale of the construction business supply chain across these areas. This would result in a non-significant, temporary, medium-term, **minor beneficial** effect in the local study area, the labour market area and five authorities' areas.

16.9.8 Further work will be undertaken to explore options for a robust estimation of the number of construction supply chain jobs related to the Project, alongside the mitigation measures and initiatives set out in the Outline Employment, Skills and Business Strategy in the ES stage and an updated assessment of the employment effects will also be provided within the ES.

Labour Market

16.9.9 The Project has the capacity to draw labour away from other construction sites during the initial construction phase, potentially causing other construction projects to be delayed or cancelled because of a shortage of the right type of construction labour.

16.9.10 It is considered likely that a proportion of construction workers would come from outside of the three study areas to work on the Project. Research by the Construction Industry Training Board (CITB) indicates that 48% of construction workers in the South East in 2018/19 travelled at least 50 miles from home to site (CITB, 2019a). Furthermore, in the same year, 31% of construction workers travelled between 50 and 100 miles from home to site. This shows that generally the construction workforce is highly mobile and that some workers are likely to travel from outside of the study areas to work on the Project during the initial construction phase.

16.9.11 However, some of the construction workforce are likely to be sourced from within the local study area, labour market area and five authorities areas; CE data suggests there are 75,977 jobs in the construction sector in the labour market area as of 2019 and 177,082 in the five authorities area (CE, 2021), indicating there is already a large pool of construction workers available to potentially occupy construction jobs during the initial construction phase. The peak construction workforce of 1,300 workers would represent 1.7% and 0.7%, of the number of residents employed in construction within the labour market area and five authorities' areas respectively.

16.9.12 The construction workforce within and outside of the study areas would likely be highly flexible. CITB research indicates that 67% of construction workers in the South East during 2018 were expecting to work on a specific site for less than a year (CITB, 2019a), highlighting that construction workers regularly move between projects/sites. Therefore, it is reasonable to expect that this flexibility would enable the necessary workforce to be assembled to meet the peaks in labour demand during the initial construction phase, with workers then moving on to other projects as demand decreases from each peak.

16.9.13 However, considering the scale of the workforce in the labour market area and five authorities' area and how quickly construction workers can move between projects, it is likely that peaks in demand could be met without adversely affecting the supply of labour to the extent that could lead to the delay or cancellation of other construction projects. In addition, initiatives to train and upskill construction workers would be introduced during the construction phase of the Project, which would help increase the supply of construction workers to meet peak demand as discussed in the Outline Employment, Skills and Business Strategy of the Project.

16.9.14 Considering the long distances construction workers can travel to site, how quickly they can move between projects and the size of the existing construction workforce, the sensitivities of the local study area, labour market area and five authorities' area construction labour markets are judged to be medium, low and low, respectively. Based on these factors, it is expected the existing construction workforce would fulfil the peak level of labour demand (1,300 workers) generated by the Project during the initial construction phase. The Project itself would also generate benefits through the training and upskilling initiatives that would be introduced during the construction of the Project; therefore, the magnitudes of impact within the local study area, labour market area and five authorities' area are judged to be low, negligible and negligible, respectively. This results in a non-significant, temporary, medium-term, **minor beneficial** effect in the local study area and non-significant, **negligible** effects in the labour market and five authorities' areas.

Business Disruption

16.9.15 For the purposes of this assessment, the receptor comprises existing business activities which may be disrupted by the Project through changes to their operations, either directly or indirectly. The sensitivity of the receptor is determined by the business and its ability to relocate or adjust its operations. Businesses within the Project site boundary are assumed to be a high sensitivity receptor, those within the local study area are low-medium sensitivity depending on their location and extent to which their operation is airport-related, and businesses within the labour catchment and five authorities' areas are a low sensitivity receptor.

16.9.16 There are elements that could impact on businesses during the initial construction phase, which relate mainly to the construction compounds and the commencement of the preparatory works (ie surface access works) to improving the terminals' junction capacity in 2029 onwards.

16.9.17 The construction compounds (ie main contractor compound; airfield satellite compounds to serve the north and south terminal roundabouts works; and surface access satellite contractor compound) would be established in 2024 and would remain in place for the entire construction phase. All construction compounds would be temporary and would be reinstated to their previous use following completion of construction works.

16.9.18 None of the construction compounds are likely to directly disrupt businesses. In particular, the main contractor compound would be located in the south eastern part of the airport, to the west of the perimeter road and it is likely that a new temporary access from the existing Perimeter Road East would be provided to enable separation of construction traffic from the existing operational traffic. The satellite compound is anticipated to be to the west of Taxiway Uniform and south of the Boeing hangar and will serve airfield works solely. Moreover, the South Terminal roundabout surface access satellite compound would be located to the north of the South Terminal roundabout and Airport Way. The compound is anticipated to occupy an area of approximately two hectares. The North Terminal roundabout surface access satellite compound is anticipated to occupy an area of approximately 1.6 hectares.

16.9.19 Chapter 12: Traffic and Transport indicates that the embedded mitigation measures in the form of the Construction Traffic Management Plan will aim to reduce impact on journey times, particularly during the peak hours. The chapter outlines that the increase in construction traffic would not lead to a significant increase in driver delay because of mitigation measures, minimising the potential effect of traffic associated with businesses that operate in and around the site, local study area and labour market area.

16.9.20 Chapter 14: Noise and Vibration states that the initial construction phase noise modelling indicates that there is potential for adverse noise impacts in the areas bordering the airport and as such it is assessed that short-term, moderate adverse impacts would occur in the local study area. Therefore, those businesses within and surrounding the airport are likely to be impacted by the noise during the initial construction period. The noise impacts in the wider areas are expected to be low.

16.9.21 Synthesising the above, the magnitude of this impact is considered to be low on the Project site boundary and in the local study area, with a high and low-medium receptor sensitivity, respectively, resulting in non-significant, temporary, medium-term, **minor adverse** effect in both these impact areas. A non-significant, **negligible** effect is expected in the wider study areas.

Business Displacement

16.9.22 The construction of End Around Taxiway West during 2026 would lead to the displacement of part of the Purple Parking facility into an area of Crawter's Field that would be commenced between 2025 and 2026, ie the replacement provision would be provided prior to works, enabling Purple Parking to move and continue unhindered before the existing facility is removed. In this context, sensitivity of businesses within the Project boundary is judged to be low and the magnitude of impact as negligible, resulting in a non-significant, **negligible** effect. In the other study areas (local study area and labour market area), impact magnitude is judged to be negligible respectively, resulting in non-significant, **negligible** effects.

Population

16.9.23 As identified in paragraph 16.9.3, the number of construction workers would peak in the initial construction phase at around 1,300 workers in October 2026, and with a higher range of workers

per annum (typically around 820) than during any of the other phases of the socio-economic assessment.

16.9.24 If the peak number of workers were to move to the local study area and labour market area from outside and reside there temporarily, it would equate to an increase in the local population of around 0.9%. Therefore, the impact magnitude on all study areas is assessed as negligible. Any increase in population would impact two already sizeable populations, which are forecast to increase in the future. Therefore, the sensitivity of the population of the local study area and labour market area is judged as low and negligible, respectively. This would result in a non-significant, **negligible** effect on the population in the local study area and labour market area. There is assumed to be no effect on the population at the five authorities' area level.

Housing

16.9.25 The introduction of the temporary construction workforce could lead to a temporary increase in the need for housing, as some of the construction workers may choose to live locally while working on the Project's construction. However, as indicated by the CITB, construction workers in the South East of England typically expect to spend less than a year on a specific project (CITB, 2019a) and travel long distances to work, so it is likely that any demand for housing would be short-term. Temporary accommodation such as rooms in bed and breakfasts for workers who prefer to live locally during construction could also be organised through contracting organisations (subject to tendering requirements).

16.9.26 To reduce the need for locally-based accommodation a Travel Plan (as part of the Outline Code of Construction Practice (CoCP)) will be developed to encourage workers to travel from their permanent place of residence to work through initiatives such as subsidised travel.

16.9.27 Taking into account the above, the impact magnitude in the local study area and labour market area is judged as negligible. The sensitivity of the respective housing supply is judged as low and negligible. This would result in a non-significant, temporary, medium-term, **negligible** effect in the local study and the labour market areas.

Resident Disruption

16.9.28 For the purposes of this assessment, the receptor comprises existing residents who may be disrupted by the Project's construction, either directly or indirectly, in terms of their ability to access local services or changes in travel times.

16.9.29 Chapter 12: Traffic and Transport outlines that construction traffic is expected to be relatively localised with non-significant, negligible effects on driver delay, pedestrian and cycling amenity, and accidents and safety during this phase. Passenger crowding will be increased during this phase due to primarily the incremental growth in passenger numbers and those of the Project construction workforce who travel to site by rail. However, there is capacity in the current public transport to accommodate the forecast increase and as such the effect is non-significant negligible to minor adverse.

16.9.30 Chapter 14: Noise and Vibration states that the initial construction phase noise modelling indicates that there is potential for adverse noise impacts in the areas bordering the airport and this is likely to occur also at night-time. Therefore, those residences surrounding the airport is likely to be impacted by the noise during the initial construction period. The noise impacts in the wider areas are expected to be low.

16.9.31 The potential for the construction works to disrupt residents is considered to be low in terms of magnitude in the local study area and negligible in the labour market area. The sensitivity of the resident population for the areas taking account of resident numbers and proximity to Gatwick are considered low and negligible, respectively. This results in a non-significant, temporary, medium-term, **minor adverse** effect in the local study area and non-significant, **negligible** effect in the labour market area.

Community Facilities and Services

16.9.32 The introduction of a temporary construction workforce linked to the Project has the potential to increase demand for community facilities and services for the period during the workforce remains in the area. It is estimated that around 820 construction workers would work on the Project across the time span of this construction phase, with up to approximately 1,300 workers at the peak in October 2026. It is considered appropriate to use this range as the basis from which to analyse the potential impact these workers could have on different community facilities and services within the Project site boundary and local study area.

16.9.33 Chapter 5: Project Description outlines that during each day of construction in the initial construction phase, the majority of the temporary construction workforce would be based out of the main contractor compound in the south eastern part of the Airport, with others operating from the airfield satellite contractor compound south of the existing Boeing hangar or the satellite compounds for north and south terminals. All compounds would provide welfare facilities (including office, meeting room space, canteen/locker rooms and waste processing area) and according to the CoCP (an Outline CoCP is provided at Appendix 5.3.1), health care would also be provided for construction workers on-site (ie a health care practitioner would be available for construction workers to consult). These initiatives would limit the need for workers to travel to use other local facilities beyond those provided within the contractor compounds.

16.9.34 The magnitude of impact related to the introduction of a temporary workforce ranging from around 820 to 1,300 workers in size over the majority of the initial construction phase is judged to be medium considering the potential demand it could generate for community facilities and services and the potential for the facilities in each construction compound to offset additional demand in the Project site boundary and the local study area. The sensitivity of community facilities and services within the Project site boundary and local study area is considered low due to the existing supply being well developed. This results in the Project having a non-significant, temporary, medium-term, **minor adverse** effect on community facilities during the initial construction phase for both the Project Site boundary and the local study area.

Community Cohesion

16.9.35 The introduction of a temporary workforce has the potential to affect community cohesion through how the workforce interacts with the existing population. These workers would mainly be based on the construction compounds and be managed through the implementation of the CoCP and construction worker Code of Conduct. Therefore, the magnitude of impact is considered to be low.

16.9.36 The sensitivity of the community in the local study area considering the size and proximity to the Project site boundary is considered to be medium. This results in a non-significant, temporary, medium-term, **minor adverse** effect on community cohesion on the site and in the local study area.

Compensation

16.9.37 Detailed information on compensation measures related to effects such as displacing existing businesses and disruption through construction noise and traffic and is not available at this stage of the Project; therefore, potential socio-economic effects linked to compensation will be considered in the ES.

Further Mitigation and Future Monitoring

16.9.38 No further mitigation measures beyond those outlined in Section 16.8 and those presented in Chapter 18: Agricultural Land and Recreation (Table 18.8.1 and para 18.9.22) – in relation to the open space potential loss - are proposed.

Future Monitoring

16.9.39 No future monitoring measures are proposed in relation to socio-economic receptors.

Significance of Effects

16.9.40 No further mitigation or monitoring is required. Therefore, the significance of effects would remain as presented above.

First Full Year of Opening: 2029

Construction 2029 to 2032

Employment

16.9.41 The peak construction workforce between 2029 and 2032 is estimated to be around 878 workers, while the average is estimated around 595 workers. This represents a decrease from the peak workforce of the initial construction phase (ie 1,300 workers) and the average of 820 workers. This decrease is assessed to change the magnitude of impacts in the local study area, from high to medium, while the magnitude in the rest of the impact areas remains unchanged at low beneficial. This results in a significant, temporary, short-term, **moderate beneficial** effect in the local study area and non-significant, temporary, short-term, **minor beneficial** effects in the other two study areas.

Supply Chain

16.9.42 As the construction workforce is expected to decrease in number between 2029 and 2032 compared to the initial construction phase, the level of related supply chain activity is also likely to decrease. The level of construction employment will still be large in the context of the size of the local study area construction sector as of 2019; therefore, the effect remains the same as in the initial construction phase; an impact magnitude of low resulting in a non-significant, temporary, short-term, **minor beneficial** effect. The magnitude of impact in the labour market area and five authorities' area between 2029 and 2032 would be negligible, resulting in non-significant, temporary, short-term, **negligible to minor beneficial** effects in both areas.

16.9.43 These effects will be further enhanced once the Outline Employment, Skills and Business Strategy initiatives in relation to supply chain (such as GAL will work closely with lead contractors to maximise the inclusion of SMEs and smaller businesses into contract supply chains in order to drive up investment in local businesses) are implemented.

Labour Market

16.9.44 Considering the average number of workers on site between 2029 and 2032 is forecast to decrease compared to the initial construction phase, the Project is likely to place less pressure on the construction labour market. This is set in the context of the labour supply increasing within labour market area which indicates there would likely be an increase in the number of construction workers within the local study area, labour market area and five authorities' area. These are not considered to be of a scale that would change impact magnitudes and receptor sensitivities; therefore, the significance of effect between 2029 and 2032 would remain the same as in the initial construction phase; non-significant, temporary, short-term, **minor beneficial** for the local study area and non-significant, **negligible** for the labour market and five authorities' areas.

Business Disruption

16.9.45 Businesses could be disrupted between 2029 and 2032 due to factors such as increases construction traffic and changes in noise levels. In addition, improvements to Longbridge roundabout where A23 meets A217 will be undertaken between 2031 and 2032. The construction compound for these improvements will be approximately two hectares of land north east of the roundabout. Chapter 12: Traffic and Transport states that most junctions would have no significant or low magnitude of impact in terms of driver delay. The rest of traffic impacts including pedestrian and cycling delay, pedestrian and cycling amenity, accidents and safety and public transport are assessed as non-significant.

16.9.46 Chapter 14: Noise and Vibration indicates that there is potential for adverse noise impacts in the communities, including businesses, surrounding the airport during the construction phase of 2029- 2032. These effects are considered to the unchanged from the 2024 to 2029 assessment.

16.9.47 Overall, the magnitude of this impact is considered to be low on the Project site and in the local study area, with high and low-medium receptor sensitivity, respectively, resulting in non-significant, temporary, short-term, **minor adverse** effect in these areas. A non-significant, **negligible** effect is expected in the wider study areas.

Business Displacement

16.9.48 Detailed information is not currently available regarding what business could be displaced from 2029 to 2032. However, GAL expects that any displaced businesses will be provided with equivalent facilities prior to being displaced enabling them to continue activity without pause. Therefore, the magnitude of impact upon the area within the Project boundary and the other study areas (local study area and labour market area) remains negligible as per the initial construction phase, with the sensitivity of the area within the Project boundary and other study areas also remaining the same (low and negligible, respectively). This results in non-significant, **negligible** effects on all applicable study areas.

Population

16.9.49 The change in the size of the average construction workforce and resident population compared to the initial construction phase is not considered to be of the scale that would change the impact magnitude and receptor sensitivity judgments for the previous assessment period. This is justified on the basis that the initial construction period is anticipated to have the highest peak in construction workforce (ie 1,303 workers) compared to this phase (with a peak of 880 workers) as

presented in Table 16.7.1. Therefore, the population effect would remain as non-significant, **negligible** for the local study area and labour market area. There is considered to be no effect on the population at the five authorities area level.

Housing

16.9.50 There is a decrease in the size of the workforce compared to the initial construction phase and on this basis the magnitude of impact remains negligible. Therefore, the significance of effect would remain as non-significant, temporary, medium-term, **negligible** effect in the local study and the labour market areas.

Resident Disruption

16.9.51 Residents could be disrupted between 2029 and 2032 due to factors such as increases in construction traffic and changes in noise levels. Chapter 12: Traffic and Transport outlines that most junctions would have no significant or low magnitude of impact in terms of driver delay. The rest of traffic impacts including pedestrian and cycling delay, pedestrian and cycling amenity, accidents and safety and public transport are assessed as non-significant. Passenger crowding will be increased with the worst-case scenario indicating that at morning peak-time the northbound service might have as the highest percentage of standing capacity occupied on train services being around 35% (indicating busy trains into London). Overall, the effect on public transport is assessed as non-significant, negligible to minor adverse effect.

16.9.52 Chapter 14: Noise and Vibration states that the noise modelling indicates that there is potential for adverse noise impacts in the areas bordering the airport and nuisance is likely to occur also at night-time. Therefore, those residences surrounding the airport is likely to be impacted by the noise during the construction of this phase. The noise impacts in the wider areas are expected to be not significant.

16.9.53 The potential for the construction works to disrupt residents is considered to be low to medium in terms of magnitude in the local study area and negligible in the labour market area. The sensitivity of the resident population for the areas taking account of resident numbers and proximity to Gatwick are considered low and negligible, respectively. This results in a non-significant, temporary, short-term, **minor adverse** effect in the local study area and non-significant, **negligible** effect in the labour market area.

Communities Facilities and Services

16.9.54 Considering the change in the scale of the construction workforce, the assessment of effects regarding community facilities and services would be the same between 2029 and 2032 as during the initial construction phase; non-significant, temporary, short-term, **minor adverse** for the Project site and local study area. No effects are considered likely for the labour market area and five authorities' area in terms of community facilities and services in 2029.

Riverside Garden Park

16.9.55 Riverside Park will be impacted by works associated with infrastructure improvements to serve the North Terminal. Chapter 18: Agricultural Land Use and Recreation identifies that 0.75 hectares of public open space along the boundary of Riverside Garden Park would be permanently lost (relating to c. 5m strip of the boundary of the Riverside Garden Park) as a result of the proposed new grade separated junction to serve the North Terminal. The provision of new areas of open space in vicinity will mitigate these impacts.

16.9.56 The Riverside Park is a designated open space and as such it is considered a highly sensitive receptor. The impact of the Project on the Riverside Garden Park is assessed to be medium adverse. This would result in a significant, temporary, medium- (to long-) term **moderate adverse** effect within the Project site boundary. The magnitude of impact in the local study area is considered low due to the wider supply of open space and combined with the fact that there will be a replacement open space, which will be at least of the same area as that which could be lost, resulting in a non-significant, **minor adverse** effect.

Community Cohesion

16.9.57 Considering the change in the scale of the construction workforce that would work on the Project from 2029 to 2032, the assessment of effects regarding community cohesion remains the same as during the initial construction phase; non-significant, temporary, short-term, **minor adverse** for the Project site and local study area.

Operation

Employment

16.9.58 Considering the number of jobs in each of the study areas in 2019 and the future projections, the sensitivity of the local study area is judged as medium, with the labour market area and five authorities' area both having low sensitivity.

16.9.59 In 2029, ICF forecasts that the Project would lead to an increase of c.1,000 direct jobs supported by Gatwick over the base case. It has been calculated that 700 of these direct jobs would be filled by people from within the labour market area and five authorities' area[15].

Table 16.9.1: First Full Year of Opening Direct Employment

Geography	Direct Jobs (2029)
Labour Market Area	700
Five Authorities Area	700
Total	1,000

16.9.60 The Project in 2029 would generate a further £67m of GVA, of which some would be retained within the local labour market and five authorities' areas (£47m and £49m, respectively).

Table 16.9.2: First Full Year of Opening Direct GVA

Geography	Direct GVA p.a. (2029)
Labour Market Area	£47m
Five Authorities Area	£49m
Total	£67m

16.9.61 A specific figure has not been calculated for the local study area. However, analysis of the Gatwick passholder database indicates that 33% of existing Gatwick staff commute from within the local study area. It is likely the commuting patterns of the new workers would be similar to

[15] Direct economic impacts (ie employment and GVA) are those that occur through economic activity conducted on-site.

existing workers, so it can be expected that a certain proportion of the additional direct jobs and associated GVA would be retained within the local study area.

16.9.62 Overall, the direct jobs generated by the Project would equate to 0.1% of jobs within the labour market area in 2029. Considering this and other factors, the impact magnitude in the local study area, labour market area and five authorities' area is judged as low, negligible and negligible, respectively. This results in a non-significant, **minor beneficial** effect in the local study area and a non-significant, **negligible to minor beneficial** effect in the labour market area and five authorities' area. These conclusions will be refined in the ES by including comparisons between the value of direct GVA generated by the Project and total GVA in the applicable study areas.

Supply Chain

16.9.63 The Project is estimated to generate 1,900 indirect and 3,800 catalytic jobs in the first full year of opening[16]. A higher number of these indirect and catalytic jobs are expected to be captured within the five authorities' area (see Table 16.9.3). This also applies to indirect and catalytic GVA (see Table 16.9.4).

Table 16.9.3: First Full Year of Opening Indirect and Catalytic Employment

Geography	Indirect Jobs (2029)	Catalytic Jobs (2029)
Labour Market Area	700	3,300
Five Authorities Area	1,300	3,800
Total	1,900	3,800

Table 16.9.4: First Full Year of Opening Indirect and Catalytic GVA

Geography	Indirect GVA p.a. (2029)	Catalytic GVA p.a. (2029)
Labour Market Area	£48m	£223m
Five Authorities Area	£91m	£260m
Total	£130m	£260m

16.9.64 The indirect and catalytic jobs generated by the Project would equate to 0.5% of jobs within the labour market area in 2029. Considering the difference in scale of indirect and catalytic employment and GVA compared to the value of direct employment and GVA generated by the Project in 2029, the impact magnitude is assessed as medium in the local study area and low in the labour market area and five authorities' area. The sensitivities of each area are considered the same as in the assessment of employment for 2029, which are medium for the local study area and low for the labour market and five authorities' areas. This would result in a significant, permanent, **moderate beneficial** effect in the local study area and non-significant, permanent, **minor beneficial** effect in the labour market and five authorities' areas.

[16] Indirect economic impacts are associated with activity in the supply chain firms that service the airport. These firms can include those located near to Gatwick or in wider study areas (eg five authorities' area). Catalytic economic impacts represent those induced by firms relocating or expanding in order to take advantage of the increased connectivity the Project will bring to Gatwick.

16.9.65 In addition to the catalytic effects identified above, there is also scope for the Project to support the wider attraction of FDI and increased trade in qualitative terms. Further analysis will be undertaken to inform the ES.

Labour Market

16.9.66 The additional direct employment generated by the Project (1,000 employees) would increase demand for workers within each of the study areas. As shown in Appendix 16.6.1 Table 2.1.5, as of March 2020 (at a pre-pandemic level -under what would be considered more normal economic circumstances compared to 2021) there were 285, 2,915 and 7,110 jobseekers allowance claimants in the local study area, labour market area and five authorities' area respectively. This indicates that there is flexibility within the labour supply to absorb the potential labour requirement.

16.9.67 Table 2.1.45 of Appendix 16.6.1 compares the anticipated labour supply of the labour market area based on planned housing numbers (current trajectories) with the labour supply which is needed to support forecast job growth (based on CE forecasts). This shows by the first year of opening (2029) that there is expected to be labour supply of 1,230,636 in the labour market area based on current housing trajectories; this is 81,092 higher than the 1,149,544 labour supply which would be needed to support CE's forecast of jobs at that time. Therefore, the number of people that could take up the operational jobs created by the Project would likely have increased. The same labour supply and employment growth gap figures have not been prepared for the entire five authorities' area. However, the labour market area contains around half of total employment in the five authorities' area, so this trend is also likely to apply to the five authorities' area.

16.9.68 Due to the low-level geographies used to define the local study area, labour supply and employment balance analysis is not possible. However, looking at the six local authorities that are either entirely or partially included within the local study area shows the following.

- Crawley, Horsham and Mid Sussex (ie the North West Sussex Housing Market Area) are all anticipated to have a labour supply which exceeds demand as of 2029 (and indeed throughout the projection period). This surplus exceeds 20,000 as of 2029 and is shown in Diagram 5.2.1 of Appendix 16.6.2.
- Mole Valley (which is within the North East Surrey HMA) is anticipated to have a surplus in labour supply exceeding 3,000 as of 2029. Although there are some shortfalls elsewhere in its HMA (Elmbridge, as shown in Diagram 5.2.2. of Appendix 16.6.2) the HMA as a whole is expected to maintain a surplus.
- Reigate and Banstead and Tandridge are also expected to have a surplus in labour supply as of 2029, in the region of 4,000 combined, which is also maintained over the projection period (this is shown in Diagram 5.2.2 of Appendix 16.6.2).

16.9.69 Therefore, the position of a labour surplus in 2029 is also likely to occur within the local study area.

16.9.70 Considering the existing level of labour available within the study areas and the potential future increase in the labour supply, the local study area, labour market area and five authorities' area are judged to have sensitivity levels of medium, low and low, respectively. The magnitude of impact on the local study area is judged to be low, with negligible impacts in the labour market area and five authorities' area. This would result in a non-significant, permanent, **minor adverse**

effect in the local study area, and non-significant, permanent, **negligible** effects in the labour market and five authorities' areas.

Business Disruption

16.9.71 Chapter 12: Traffic and Transport indicates the Project will have a non-significant effect on drivers delay together with the rest of the traffic impacts. Therefore, it is likely businesses will experience limited disruption to operations because of increased journey times. In socio-economic terms, this is considered to represent negligible impacts within the Project boundary and local study area and no change in the labour market area. In addition, Chapter 14: Noise and Vibration indicates that there is potential for adverse noise impacts in the communities, including businesses, surrounding the airport during 2029- 2032.

16.9.72 As assessed above (paras 16.9.58 to 16.9.70), there will be, however, minor beneficial effects in employment and moderate beneficial effects in the supply chain of the local study area during this phase that are expected to benefit local businesses.

16.9.73 Considering all the above, the magnitude of the impact is considered low while the sensitivity of businesses within the Project boundary, local study area and labour market area are considered to be high, medium-low and low, respectively (16.9.15). This results in a non-significant, **minor adverse** effect within the Project boundary and **negligible** in the local study area. There is **no change** in the labour market area.

Business Displacement

16.9.74 Although no businesses are expected to be displaced during this phase, GAL has committed to provide equivalent facilities to any potentially displaced businesses prior to being displaced enabling them to continue activity without interruption. Therefore, the magnitude of impact upon the area within the Project boundary and the other study areas (local study area and labour market area) remains negligible as per the initial construction phase, with the sensitivity of the area within the Project boundary and other study areas also remaining the same (low and negligible respectively). This results in non-significant, **negligible** effects on all applicable study areas.

Population

16.9.75 Table 2.1.45 of Appendix 16.6.1 shows a projected labour supply surplus of 81,052 in 2029 within the labour market area. This indicates there is a capacity within the local labour market for existing residents to take up the additional jobs linked to the full opening of the Project in 2029. Some people may move to within the local study area and labour market area to take advantage of the jobs; however, considering the proportion of existing Gatwick workforce that comes from the local study area and labour market area and the potential labour surplus, a high proportion of the jobs would be likely to be taken up by the existing residents.

16.9.76 Following this analysis, the magnitude of impact on the population within the local study area and labour market area is assessed as negligible. The receptor sensitivity of the population is considered low in the local study area and negligible in the labour market area because of the difference in the number of residents. This results in a non-significant, **negligible** effect in the local study and labour market areas.

Housing

16.9.77 The Assessment of Population and Housing Effects report (Appendix 16.6.2) outlines that it is unlikely that the Project would place pressure on the housing supply of local authorities within the study areas or that an uplift in housing would be needed to increase the labour supply in response to the operational employment generated by the Project. This is because the labour supply which is expected to be generated based on planned housing growth is likely to be sufficient (indeed it is anticipated to provide a substantial surplus) when compared with the labour supply that is needed to support job growth as forecast by CE. This would leave a surplus of labour which is available to fill additional job growth in the labour market area, such as that generated by the Project, without impacting on the need or demand for housing.

16.9.78 More information is set out in Section 5 of Appendix 16.6.2 and the overall labour surplus in the labour market area is summarised in Table 2.1.45 of Appendix 16.6.1. In this context, the magnitude of impact within the local study area and labour market areas is considered negligible, with the two areas having low and negligible levels of sensitivity due to the respective size in the stock of dwellings in these areas. This would result in a non-significant, **negligible** effect in the local study and labour market areas.

Resident Disruption

16.9.79 Chapter 12: Traffic and Transport indicates the Project during the first full year of opening could cause disruption to residents through severance, driver delays and pedestrian and cyclist delays, but the effects are all assessed as non-significant.

16.9.80 Moreover, Chapter 14: Noise and Vibration identifies that ground noise will increase in the first full year of operation are lower than those predicted in 2032. The combination of the traffic and noise effects is assessed to translate into non-significant impacts within the Project boundary, local study area and labour market area.

16.9.81 The sensitivity of businesses within the local study area and labour market area are considered to be low and negligible respectively. This results in non-significant, **negligible** effects within the labour market area and non-significant, **negligible to minor adverse** effect in the local study area.

Community Facilities and Services

16.9.82 Additional passengers travelling to the airport are not expected to typically access community facilities and services on the site or in the local study area. The increase in workers could increase the use of community facilities and services on site and in the local study area. However, considering the effect on the population is considered negligible in the local study area, so the likely impact would be negligible. Chapter 17: Health and Wellbeing identifies mitigation measures that could be put in place to lower potential ambulance call-outs linked to the increase in passengers.

16.9.83 Considering the change in population, potential mitigation measures and potential for noise to impact community facilities, the magnitudes of impact within the Project site boundary and local study area and labour market area are judged to be negligible and low, respectively. The sensitivity of community facilities on site is judged to be low and medium in the local study area. This results in a non-significant, **negligible** impact within the Project site boundary and non-significant, **minor adverse** effect in the local study area.

Community Cohesion

16.9.84 Additional passenger arrivals and departures from Gatwick are considered to have a negligible impact in the local study area as it is considered likely that passengers will generally remain concentrated in and around the Project site boundary and spend limited time in the local area on a temporary basis. Short-term overnight stays in hotel accommodation are not deemed to be material to potential effects on the local community. Additional workers travelling to and from Gatwick for commuting purposes would likely, either be from the local community reflecting the broad share of Gatwick's employees that live within the local study area (currently 33% of the total), or pass through the local area as part of commuting journeys by either public transport or private car. Therefore, taken together, the impact on community cohesion in 2029 is considered negligible within the Project site boundary and local study area.

16.9.85 The sensitivity of the community within the Project site boundary and local study area are judged to be negligible and low, respectively. This results in a non-significant, **negligible** effect within the Project site boundary and non-significant, **negligible to minor adverse** effect in the local study area.

Further Mitigation

16.9.86 No further mitigation measures beyond those outlined in Section 16.8 are proposed.

Future Monitoring

16.9.87 No future monitoring measures are proposed in relation to socio-economic receptors.

Significance of Effects

16.9.88 No further mitigation or monitoring is required. Therefore, the significance of effects would remain as presented above.

Interim Assessment Year: 2032

Construction 2033 to 2038

Employment

16.9.89 The peak construction workforce between 2032 and 2037 is projected to be approximately 400 workers. This represents a decrease (-50%) compared to the previous phase, which is considered to be sizeable enough to change the magnitudes of impact in the local study area from medium to low. The magnitude of the impact to the labour market and five authorities will remain unchanged. Therefore, it is assessed that there will be non-significant, **minor beneficial** effect in the local study area and non-significant, **negligible to minor beneficial** in the labour market area and five authorities' area.

Supply Chain

16.9.90 As the average construction workforce would decrease between 2032 to 2037 compared to the equivalent between 2029 and 2032, activity in the supply chain would likely decrease as a consequence. This change will not however affect the impact magnitude which remains low. Therefore, conclusions for the 2032-37 phase remain the same from 2029 to 2032; non-significant, **minor beneficial** for the local study area and non-significant, **negligible to minor beneficial** in the labour market area and five authorities area.

16.9.91 These effects may be further enhanced with the implementation of initiatives set out in the Outline Employment, Skills and Business Strategy in relation to the supply chain (for example, GAL will work closely with lead contractors to maximise the inclusion of SMEs and smaller businesses into contract supply chains in order to drive up investment in local businesses).

Labour Market

16.9.92 The number of on-site construction workers would decrease compared to the previous phase and the surplus supply of labour is expected to be maintained between 2029 and 2032 and increased to 2038 (see Table 2.1.45 of Appendix 16.6.1). In this context, the conclusion for the period between 2032 and 2037 remains as before. This results in a non-significant, **minor beneficial** effect in the local study area and non-significant, **negligible** effects in the labour market area and five authorities' area.

Business Disruption

16.9.93 Businesses could be disrupted between 2032 and 2037 due to factors such as increases in construction traffic and changes in noise levels. Chapter 12: Traffic and Transport runs a preliminary assessment for this period (work will be undertaken to verify model findings at a later stage) that indicates that most junctions would have no significant or low magnitude of impact in terms of delay. However, there are five junctions shown to have a medium magnitude of delay and three junctions - one is located in the Croydon area and two are located near the airport at the A23 London Road / Gatwick Road roundabout and M23 J9 – shown to have a high magnitude of delay. For these junctions, the driver delay effect has been reported as moderate to major adverse. The latter two junctions would potentially impact the operation of business in the area including Manor Royal business park.

16.9.94 Chapter 14: Noise and Vibration does not currently contain an assessment of noise linked to construction activity between 2032 and 2037 (as impacts are considered less significant compared to the previous phases).

16.9.95 On this basis, the magnitude of businesses within the Project boundary and local study area are considered medium, while the magnitude for the wider areas is low. In addition, the sensitivity of businesses within the Project boundary, local study area and labour market area are considered to be high, medium-low and low respectively (see 16.9.15). This results in a significant, temporary, medium-term, **moderate adverse** effect within the Project boundary, non-significant, temporary, medium-term, **minor adverse** in the local study area and **negligible** in the labour market area.

Business Displacement

16.9.96 Although no businesses are expected to be displaced during this phase, GAL has committed to provide equivalent facilities to any potentially displaced businesses prior to being displaced enabling them to continue activity without interruption. Therefore, the magnitude of impact upon the area within the Project boundary and the other study areas (ie local study area and labour market area) remains negligible as per the initial construction phase, with the sensitivity of the area within the Project boundary and other study areas also remaining the same (low and negligible, respectively). This results in non-significant, **negligible** effects on all applicable study areas.

Population

16.9.97 There will be a decrease in the size of the average construction workforce compared to the previous phase and this is considered of a scale that would change the impact magnitude to negligible, while the receptor sensitivity judgments from the previous assessment period remain unchanged. Therefore, the population effect in 2029-32 period is assessed to be non-significant, **negligible** for the local study area and the labour market area.

Housing

16.9.98 The change in the size of the construction workforce compared to the period between 2029 and 2032 is of a scale that would change the magnitude of impact to negligible. Therefore, it is expected that there would be a non-significant, **negligible** effect in the local study, labour market and five authorities' areas.

Resident Disruption

16.9.99 Residents could be disrupted between 2032 and 2037 due to factors such as increases in construction traffic and changes in noise levels. As discussed above, Chapter 12: Traffic and Transport runs a preliminary assessment for this period (findings will be reviewed further) which indicates that there are three junctions shown a high magnitude of delay. For these junctions, the driver delay effect is considered to be moderate to major adverse. In particular, driver delays at M23 J9 are likely to impact residents of the surrounding area of the Project site.

16.9.100 Chapter 14: Noise and Vibration does not currently contain an assessment of the construction noise for 2032 – 2037 period (as impacts are considered less significant compared to the previous phases). However, it is expected that some nuisance will disrupt residences in proximity to the project site.

16.9.101 On this basis, the potential for the construction works to disrupt residents is considered to be low to medium in terms of magnitude in the local study area and negligible in the labour market area. The sensitivity of the resident population for the areas taking account of resident numbers and proximity to Gatwick are considered low and negligible, respectively. This results in a non-significant, temporary, medium-term, **minor adverse** effect in the local study area and non-significant, **negligible** effect in the labour market area.

Community Facilities and Services

16.9.102 Considering the change in the scale of the construction workforce, the assessment of effects regarding community facilities and services in this phase would be similar to the previous construction phase; non-significant, temporary, short-term, **minor adverse** for the Project site and local study area. No effects are considered likely for the labour market area and five authorities' area in terms of community facilities and services in 2032-2037.

Community Cohesion

16.9.103 The assessment of effects regarding community cohesion remains the same from 2032 to 2037 as in the period between 2029 and 2032, which relate to non-significant, **minor adverse** effect.

Operation

Employment

16.9.104 In the interim assessment year, ICF and Oxera forecast the Project would lead to an increase over the base case of approximately 3,200 direct jobs at Gatwick. The number of jobs that would be taken by people from the labour market area and five authorities' area is broadly similar as presented below.

Table 16.9.5: Interim Assessment Year Direct Employment

Geography	Direct Jobs (2032)
Labour Market Area	2,200
Five Authorities Area	2,300
Total	3,200

16.9.105 The Project would also generate an increase over the base case in direct GVA of £225m per annum with broadly similar GVA levels to be generated within the labour market area than the five authorities' area.

Table 16.9.6: Interim Assessment Year Direct GVA

Geography	Direct GVA p.a. (2032)
Labour Market Area	£157m
Five Authorities Area	£165m
Total	£225m

16.9.106 Considering the scale of the increases over the base case in direct jobs and GVA, the magnitude of impact is judged to be medium, low and low in the local study area, labour market area and five authorities' area, respectively. Using the same levels of sensitivity as in the 2029 employment assessment, this results in a significant, **moderate beneficial** effect in the local study area and non-significant, **negligible to minor beneficial** effects in the labour market and five authorities' areas.

Supply Chain

16.9.107 The Project is estimated to generate approximately 6,100 indirect jobs and 11,600 catalytic jobs in the interim assessment year (see Table 16.9.7). A high proportion of the jobs would be retained within the labour market and five authorities' areas.

Table 16.9.7: Interim Assessment Year Indirect and Catalytic Employment

Geography	Indirect Jobs (2032)	Catalytic Jobs (2032)
Local Labour Market	2,200	9,900
Five Authorities Area	4,200	11,600
Total	6,100	11,600

16.9.108 The Project is also estimated to generate £431m of indirect GVA and £820m of catalytic GVA annually (see Table 16.9.8).

Table 16.9.8: Interim Assessment Year Indirect and Catalytic GVA

Geography	Indirect GVA (2032)	Catalytic GVA (2032)
Labour Market Area	£158m	£705m
Five Authorities Area	£301m	£820m
Total	**£431m**	**£820m**

16.9.109 Considering the scale of additional employment and GVA, the impact magnitudes in the local study area, labour market area and five authorities' area are judged to be high, medium and medium, respectively. Using the same levels of sensitivity as for the first full year of opening, the resulting effects in the local study area, labour market area and five authorities are assessed as significant, **moderate to major beneficial** in the local study area and non-significant, **minor beneficial** in the labour market and five authorities' areas.

Labour Market

16.9.110 The Project in the interim assessment year would generate considerable labour market requirements, and therefore, would likely have a more sizeable impact on the labour market of the three study areas. Therefore, the magnitudes of impact on the local study area, labour market area and five authorities' area are considered to be medium, low and low, respectively.

16.9.111 The labour market sensitivities of the three study areas are considered to be the same as in the first full year of opening. This would result in a significant, **moderate adverse** effect in the local study area and non-significant, **minor adverse** effects in the labour market and five authorities' areas.

16.9.112 Initiatives and measures identified in the Outline Employment, Skills and Business Strategy could partly or wholly mitigate the significant adverse effect of the Project on the local study area. The details of these measures have not been finalised and therefore will be considered in detail in the ES.

Business Disruption

16.9.113 Chapter 12: Traffic and Transport indicates the Project will have a non-significant effect on driver delay. However, there are two junctions – that also serve Manor Royal and other businesses in the surrounding area of the Project Site – where the driver delay effect is considered to be moderate to major adverse. Therefore, it is likely businesses in proximity will experience some temporary disruption to operations because of increased journey times during this phase. In socio-economic terms, this is considered to represent a low to medium impact within the Project boundary and local study area, and no change in the labour market area.

16.9.114 The sensitivity of businesses within the Project boundary, local study area and labour market area are considered to be high, medium-low and low, respectively (16.9.15). This results in a significant, **moderate adverse** effect within the Project boundary and non-significant, **minor adverse** effect in the local study area. There is **no change** in the labour market area.

Business Displacement

16.9.115 Although no businesses are expected to be displaced during this phase, GAL has committed to provide equivalent facilities to any potentially displaced businesses prior to being displaced enabling them to continue activity without interruption. Therefore. the magnitude of impact upon

the area within the Project boundary and the other study areas (local study area and labour market area) remains negligible as per the initial construction phase, with the sensitivity of the area within the Project boundary and other study areas also remaining the same (low and negligible respectively). This results in non-significant, **negligible** effects on all applicable study areas.

Population

16.9.116 Table 2.1.47 in Appendix 16.6.1 identifies the labour surplus in the labour market area would be broadly maintained, from 81,092 in 2029 to 81,652 in 2032. This indicates that there is capacity within the local labour market for existing residents to take-up the additional jobs in the interim assessment year of the Project. The Assessment of Population and Housing Effects report (see Appendix 16.6.2 Section 5 and Diagrams 5.2.1-2) also shows that the authorities in the labour market area would not suffer from a potential labour supply 'pinch' in the interim assessment year. Therefore, the significance of effect identified for the first full year of opening is considered to apply to the interim assessment year; non-significant, **negligible** in the local study and the labour market areas.

Housing

16.9.117 The Assessment of Population and Housing Effects report (see Appendix 16.6.2, summarised for the labour market area in Table 2.1.45 of Appendix 16.6.1) indicates that based on the current housing trajectories of authorities in the labour market area the increase in labour supply linked to the population growth generated would be more than enough to meet forecast job growth, with a substantial surplus available to accommodate the labour demand generated by the Project. Therefore, the significance of effect for the first full year of opening is considered to apply to the interim assessment year; non-significant, **negligible** in the local study and labour market areas.

Resident Disruption

16.9.118 Chapter 12: Traffic and Transport runs a preliminary assessment for 2032 (findings will be reviewed further) which indicates that there are five junctions shown to have a medium magnitude of delay and three junctions shown a high magnitude of delay. For these junctions, the driver delay effect is considered to be moderate to major adverse. M23 J9 is likely to impact road travel of the residents of the surrounding area of the Project site. The rest of the traffic effects including rail crowding and station crowding, are assessed as non-significant negligible to minor adverse.

16.9.119 In addition, Chapter 14: Noise and Vibration identifies receptors including residential properties and community facilities (ie schools, nurseries, etc.) in proximity that would be mainly experience negligible to minor adverse effect, with a few experiencing a moderate adverse effect linked to ground noise. The combination of the traffic and noise effects is assessed to translate to negligible, low and negligible impacts within the Project boundary, local study area and labour market area.

16.9.120 The sensitivity of receptors within the Project boundary, local study area and labour market area are considered to be low to medium and negligible, respectively. This results in non-significant, **negligible** effects within the Project site boundary and labour market area and a non-significant, **minor adverse** effect in the local study area.

Community Facilities and Services

16.9.121 The conclusions for the first full year of opening are considered to remain applicable to the interim assessment year; non-significant, **negligible** for the Project site and non-significant, **minor adverse** for the local study area.

Community Cohesion

16.9.122 The conclusions for the first full year of opening are considered to remain applicable to the interim assessment year; non-significant, **negligible** for the Project site and non-significant, **negligible to minor adverse** in the local study area.

Further Mitigation

16.9.123 No further mitigation measures beyond those outlined in each effect assessment are proposed.

Future Monitoring

16.9.124 No future monitoring measures are proposed in relation to socio-economic receptors.

Significance of Effects

16.9.125 No further mitigation or monitoring is required. Therefore, the significance of effects would remain as presented above.

Design Year: 2038

16.9.126 No construction impacts are assessed at this stage of the Project as all construction works will have been completed prior to this phase.

Operation

Employment

16.9.127 In the design year, the Project is forecast by ICF and Oxera (2021) to generate approximately 3,200 additional direct jobs over the base case. A similar proportion of these jobs are estimated to be retained within the labour market area and the five authorities' area.

Table 16.9.9: Design Year Direct Employment

Geography	Direct Jobs (2038)
Labour Market Area	2,400
Five Authorities Area	2,400
Total	**3,200**

16.9.128 The Project is also estimated to generate £252m of direct GVA in the design year. A similar proportion, like direct jobs, would be retained within the labour market area and five authorities' area (see Table 16.9.10).

Table 16.9.10: Design Year Direct GVA

Geography	Direct GVA p.a. (2038)
Labour Market Area	£177m
Five Authorities Area	£185m
Total	**£252m**

16.9.129 Considering the scale of the increases in direct jobs and GVA over the base case, the magnitude of impact in the local study area, labour market area and five authorities' area, is judged to be medium, low and low, respectively. Using the same levels of sensitivity as in the 2032 employment assessment, this results in a significant, **moderate beneficial** effect in the local study area and non-significant, **negligible to minor beneficial** effects in the labour market and five authorities' area.

Supply Chain

16.9.130 The Project is estimated to generate approximately 6,300 indirect jobs and 10,800 catalytic jobs in the design year (see Table 16.9.11).

Table 16.9.11: Design Year Indirect and Catalytic Employment

Geography	Indirect Jobs (2038)	Catalytic Jobs (2038)
Labour Market Area	2,300	9,300
Five Authorities Area	4,400	10,800
Total	**6,300**	**10,800**

16.9.131 In the design year, the Project is estimated to generate £492m indirect GVA and £848m catalytic GVA per annum (see Table 16.9.12).

Table 16.9.12: Design Year Indirect and Catalytic GVA

Geography	Indirect GVA p.a. (2038)	Catalytic GVA p.a. (2038)
Labour Market Area	£181m	£729m
Five Authorities Area	£343m	£848m
Total	**£492m**	**£848m**

16.9.132 The number of indirect and catalytic jobs in the design year is broadly similar to the interim assessment year and, therefore, the significance of the effects in each of the study areas remains the same as in the interim assessment year, resulting in significant, **moderate to major beneficial** in the local study area and non-significant, **minor beneficial** in the labour market area and five authorities' area.

Labour Market

16.9.133 The labour market requirement generated by the Project is estimated to be similar in the design year with the interim assessment year. Therefore, the significance of the conclusions for the interim assessment year is judged to also apply to the design year; significant, **moderate adverse** in the local study area and non-significant, **minor adverse** in the labour market and five authorities' areas. The significant adverse effect of the Project on the local study area could be

partly or wholly mitigated by measures set out in the Outline Employment, Skills and Business Support Strategy (see paragraph 16.9.1112). The details of these measures have not been finalised and therefore will be considered in detail in the ES.

Business Disruption

16.9.134 It is not expected that business will be disrupted as construction would have ceased. As a result, there is **no impact** on business disruption in the design year across all the impact areas.

Business Displacement

16.9.135 No further business displacement linked to the Project would occur in 2038 as construction will be finished and all elements of the Project will now be in place. Therefore, the Project will have **no impact** on business displacement in the design year.

Population

16.9.136 The conclusions for the interim assessment year are considered to remain applicable to the design year according to the findings of the Assessment of Population and Housing Effects (Appendix 16.6.2) and on this basis the effect is assessed as non-significant, **negligible** in the local study and labour market areas.

Housing

16.9.137 Based on the Assessment of Population and Housing Effects (Appendix 16.6.2) the amount of labour supply which can reasonably be expected to be generated based on current housing trajectories is greater than the amount of labour supply needed to support the increase in the most recent job forecast from Cambridge Econometrics, with additional jobs from the Project. In other words, the labour supply outweighs labour need across the housing study area for the entire assessment period to 2038. On this basis, the conclusions for the interim assessment year are considered to remain applicable to the design year; non-significant, **negligible** in the local study and labour market areas.

Resident Disruption

16.9.138 The conclusions for the interim assessment year are considered to remain applicable to the design year. This results in non-significant, **negligible** effects within the Project site boundary and labour market area and a non-significant, **minor adverse** effect in the local study area.

Community Facilities and Services

16.9.139 The conclusions for the interim assessment year are considered to remain applicable to the design year; non-significant, **negligible** within the Project site and non-significant, **minor adverse** in the local study area.

Community Cohesion

16.9.140 The conclusions for the interim assessment year are considered to remain applicable to the design year; non-significant, **negligible** within the Project site and non-significant, **minor adverse** in the local study area.

Compensation

16.9.141 Funding linked to the operation of the Project is likely to be distributed through measures such as the Gatwick Airport Community Fund and grants for noise insulation. Details on such measures are yet to be confirmed and will be informed through further consultation, Therefore, potential socio-economic effects linked to compensation will be assessed in the ES when more detail will be available.

Further Mitigation

16.9.142 No further mitigation measures beyond those outlined in each effect assessment are proposed.

Future Monitoring

16.9.143 No future monitoring measures are proposed in relation to socio-economic receptors.

Significance of Effects

16.9.144 No further mitigation or monitoring is required. Therefore, the significance of effects would remain as presented above.

16.10. Potential Changes to the Assessment as a Result of Climate Change

16.10.1 Climate change is not considered to have a direct impact on the socio-economic topics assessed in this chapter.

16.10.2 Changes to greenhouse gas emissions could arise through changes in economic activity related to the Project; however, this would depend on the nature of the activity, which is hard to predict considering the range of economic activities directly on the airport and the indirect and catalytic activities in the wider supply chain. An assessment of the likely significant effects on climate change is presented in Chapter 15: Climate Change and Carbon.

16.11. Cumulative Effects

Zone of Influence

16.11.1 The zone of influence (ZoI) for socio-economics has been identified based on the spatial extent of likely effects. For this topic, the ZoI is considered to be the local study area considering it is the area where receptors are most likely to be impacted upon by the Project and contain the cumulative schemes that are also most likely to impact upon the receptors.

Screening of Other Developments and Plans

16.11.2 The Cumulative Effect Assessment (CEA) takes into account the impact associated with the Project together with other developments and plans. The projects and plans selected as relevant to the CEA presented within this chapter are based upon the results of a screening exercise undertaken as part of the 'CEA shortlist' of developments (see Appendix 19.4.1). Each development on the CEA long list has been considered on a case by case basis for scoping in or out of this chapter's assessment based upon data confidence, effect-receptor pathways and the spatial/temporal scales involved.

16.11.3 In undertaking the CEA for the Project, it is important to bear in mind that the likelihood of other developments and plans being constructed varies depending on how far along the planning

process they are. For example, relevant developments and plans that are already under construction and near completion are not likely to contribute to a cumulative impact with the Project. In addition, developments and plans not yet approved or not yet submitted are less certain to contribute to such an impact, as some may not achieve approval or may not ultimately be built due to other factors. For this reason, all relevant development and plans considered cumulatively alongside the Project have been allocated into 'Tiers', reflecting their current stage within the planning and development process. Appropriate weight is therefore given to each Tier in the decision-making process when considering the potential cumulative impact associated with the Project (eg it may be considered that greater weight can be placed on the Tier 1 assessment relative to Tier 2 and Tier 3). Further details of the screening process for the inclusion of other developments and plans in the shortlist and a description of the Tiers is provided in Chapter 19: Cumulative Effects and Inter-relationships.

16.11.4 The specific developments scoped into the CEA for socio-economics are outlined in Table 16.11.1, most of which are in Tier 1 together with key site allocations in proximity that fall in Tier 2 and Tier 3. The developments included as operational in this assessment have been commissioned since the baseline studies for this Project were undertaken and as such were excluded from the baseline assessment. Full details of each of the developments are provided in Appendix 19.4.1.

Table 16.11.1: List of Other Developments and Plans Considered within Socio-Economics CEA

Description of Development	Planning Progress	Distance from the Project	Completion of Construction	Overlap with the Project?
Tier 1				
04/02120/OUT: Comprehensive mixed-use development to comprise 1510 dwellings, neighbourhood centre, primary school, recreation and open space uses, plus associated infrastructure and access roads linking the development to A23 and A217.	Permitted on 02/12/2014	5.0 km	2028	Initial Construction
2019/548/EIA: Request for screening opinion for the Proposed Development of circa 360 residential units and a small amount of commercial development of circa 7,000 sqft.	Screening Decision on 30/04/2019 EIA 7	1.5 km	c.2026	Initial Construction
CR/2015/0552/NCC: Allocated in Crawley Local Plan 2030 (Adopted). Erection of up to 1900 dwellings, 5000sq.m. of use class B1, B2 & B8 employment floorspace, 2500sq.m. of retail floorspace, a local centre/community centre (including a community hall), a new primary school, recreational open space, landscaping, and so on.	Permitted on 15/11/2016	1.6 km	2027	Initial Construction
CR/2015/0718/ARM: Allocation within Crawley Local Plan 2021-2037 (Regulation 19). Approval of	Permitted on 31/01/2019	1.6 km	2027	Initial Construction

Description of Development	Planning Progress	Distance from the Project	Completion of Construction	Overlap with the Project?
Reserved Matters for Phase 2B for 169 dwellings and associated works pursuant to outline permission CR/2015/0552/NCC for a new mixed-use neighbourhood.				
DC/10/1612: Housing/Mixed Development site allocated in the Horsham DC Planning Framework (Adopted 2015). Outline approval for the development of approximately 2500 dwellings, new access from A264 and a secondary access from A264, neighbourhood centre, comprising retail, community building with library facility, public house, primary care centre and care home, land for primary school and nursery, land for employment uses, new rail station, energy centre and associated amenity space. Full permission for the development of Phase 1 of 291 dwellings, internal roads, garages, driveways, 756 parking spaces, pathways, sub-station, flood attenuation ponds and associated amenity space. Additional phase reserved matters applications: DC/17/1473, DC/17/1993, DC/16/1841, DC/18/1213, DC/17/1223	Permitted on 17/10/2011	6.7 km	Under construction	All phases
DM/20/4127: Outline application for an expansion of the existing commercial estate with up to 7,310 sq m of new commercial space. There is currently 3,243 sq m of existing commercial space, of which 2,530 sq m will be retained and 713 sq m of lower-quality, temporary buildings and portacabins removed. The proposed increase over the existing commercial floor space is 6,597 sq m and the total amount of commercial space available on the site post expansion will be up to 9,840 sq m. They are also seeking permission for a replacement of the existing dwelling, and the creation of a new public footpath. The application is in outline, with all matters reserved except for access. Additional highways information submitted on 5th January 2021, 6th February 2021, 27th April 2021, 12th May 2021 and 7th June 2021.	Awaiting decision	7.3 km	n/a	All phases
CR/2019/0542/FUL: Demolition of existing nightclub and redevelopment of site providing 152 apartments, ground floor commercial/retail space (class A1, A3,	Permitted on 04/05/2020	4.0 km	n/a	All phases

Description of Development	Planning Progress	Distance from the Project	Completion of Construction	Overlap with the Project?
A4, B1 and/or D2 uses) split between 2 to 4 units, new publicly accessible public realm (including pocket park), new publicly accessible electric vehicle charging hub, car club and associated works.				
CR/2018/0273/FUL: Gatwick Station. Proposed construction of new station concourse/airport entrance area, link bridges, platform canopies, back of house staff accommodation and associated improvement works.	Permitted on 19/03/2019	0.0km		All phases
Tier 2				
EIA/20/0004: EIA Scoping for West of Ifield - allocated site. EIA Scoping for West of Ifield - allocated site. The proposed development is on a site of 194 hectares in size with a minimum of 3,250 homes and up to 4,000 homes along with social infrastructure, green infrastructure and highway links.	EIA Advice Given on 07/12/2020	1.5 km	n/a	All phases
TR020003: Expansion of Heathrow Airport to enable at least 740,000 air traffic movements per annum and including a new runway to the north-west of the existing airport; supporting airfield, terminal and transport infrastructure; works to the M25, local roads and rivers; temporary construction works, mitigation works and other associated development.	Scoping report submitted in May 2018	40.0 km	n/a	All phases
Tier 3				
Reigate and Banstead Allocation: Land west of Balcombe Road, Horley Strategic Business Park - Strategic Employment Site of 83ha of business space including 200,000 sqm office space.	n/a	0.4km	n/a	Not yet known
Mole Valley Land West of Reigate Road, Hookwood Site Allocation Policy SA42 - Site identified in the Reg 18 consultation draft local plan (Feb 2020 to March 2020) for 450 dwellings and two gypsy and traveler pitches	n/a	0.3km	n/a	Not yet known

Cumulative Effects Assessment

16.11.5 A description of the significance of cumulative effects upon socio-economics receptors arising from each identified impact is given below.

16.11.6 Information is not publicly available in relation to the build costs and construction period for all of the cumulative schemes. As a result, it has not been possible to assess the cumulative impact of the construction phases of all developments that are planned in the local area. However, the impacts of these schemes in terms of temporary construction employment generation and gross value added (GVA) generation will be beneficial for the economy of the local study area and labour market impact areas. With the absence of information it is not possible to provide assessment for the rest of the construction impacts.

Initial Construction Phase: 2024-2029

16.11.7 It is expected that all the permitted schemes in Tier 1 would be under construction within the Project's initial construction phase to 2029. The construction details of those schemes are not publicly available and therefore it is not feasible to estimate the potential impacts on the economy of the local study area and labour market impact area that could be generated as a result of an increased direct, indirect and induced construction employment.

16.11.8 However, the construction activity generated by these cumulative schemes is likely to overlap with the initial construction period and to eventually increase the construction activity of the local study area and the labour market impact areas. Considering the scale of these cumulative schemes, it is expected that the effect conclusions of the assessment section linked to the construction employment of the Project during the initial construction phase remain the same when considered in the context of the cumulative schemes, ie significant, temporary, medium-term, moderate to major beneficial.

First Full Year of Operation: 2029

Construction (2029 to 2032)

16.11.9 It is expected that by 2032 all the schemes will have commenced. On this basis, the construction activity during the 2029 to 2032 period will be further increased, albeit due to limitations on data availability, it is not feasible to quantify the impacts on the economy. Considering the scale of the cumulative schemes, it is expected that the effect conclusions of the assessment section linked to the construction employment of the Project during the first full year of operation construction phase will be significant, temporary, medium-term, moderate to major beneficial.

Operation (2029 to 2032)

16.11.10 The assessment for the operational cumulative effects of the 2029 first full year of the Project's operation is based on projections of future population, jobs, labour supply and housing. The potential effect of the cumulative schemes on the future population, jobs, labour supply and housing in combination with the Project is smaller than the demographic projections assessed in detail in the Assessment of Population and Housing Effects report (Appendix 16.6.2). In particular, it is expected that the schemes in Table 16.11.1 that will be operational at this phase (top four schemes) will result in the provision of c.3,900 new homes, 9,500 new residents and a minimum of 150 new jobs to 2029.

16.11.11 Therefore, it is unlikely that the Project would place pressure on the housing supply of local authorities within the study areas or that an uplift in housing would be needed to increase the labour supply in response to the operational employment generated by the cumulative schemes. On this basis, the operational conclusions associated with the Project in 2029 are not expected to change due to the cumulative developments. Similarly, it is unlikely that there will be any significant impacts on the economy, labour market, businesses and community facilities that would change the findings of the assessment at this phase.

Interim Assessment Year: 2032

Construction (2032 to 2037)

16.11.12 It is expected that between 2032 and 2037 the only schemes that will potentially be under development are those in Tier 2 and 3. As discussed above, there is no available construction information and as such it is expected that the increase in the construction activity during this period will not be of a scale to change the findings of the Project's assessment for the Interim year. As such, the effect conclusions of the assessment section linked to the construction employment of the Project during the interim assessment year construction phase will be not-significant, temporary, medium-term, minor beneficial.

Operation (2032 to 2037)

16.11.13 The potential effect of the cumulative schemes on the future population, jobs, labour supply and housing in combination with the Project is smaller than the demographic projections assessed in detail in the Assessment of Population and Housing Effects report (Appendix 16.6.2) in 2032. In particular, it is expected that the remaining Tier 1 schemes in Table 16.11.1 will be operational at this phase and will result in the provision of c.2,600 new homes, 6,400 new residents and a minimum of 130 new jobs to 2032.

16.11.14 On this basis, it is unlikely that there will be any significant impacts on the economy, labour market, businesses, housing and community facilities that would change the findings of the assessment at this phase.

Design Year: 2038

16.11.15 All the cumulative schemes are assumed to complete by 2038.

16.11.16 Most of the operational effects for the Project are considered to remain valid and unchanged by the inclusion of the cumulative developments on this phase that relates to the operational effects of Tier 2 and Tier 3 cumulative schemes.

16.11.17 Horley Strategic Business Park is proposed to deliver over 200,000sqm of office campus together with other commercial and industrial uses. According to Coast to Capital evidence for Horley Business Park it is expected that the scheme could create 15,000 new jobs. This level of new jobs is beyond those forecasted in Reigate and Banstead by CE and the various scenarios (for full details see Appendix 16.6.2). This will have an impact on the labour market of the impact areas. It should be noted that the nature of the potential job opportunities that will be generated by Horley Business Park development are expected to differ with the majority of job opportunities that will be created by the Project. In particular, the business campus is expected to generate primarily high-skilled employment opportunities compared to low to medium-skilled opportunities that will be generated by the Project (Oxera, 2021). In addition, it is understood that high-skilled employees tend to commute further (Oxera, 2021), and on this basis no further impacts on the

housing supply of the impact areas are expected to occur. Synthesising the above, the findings of the assessment for the design year will remain unchanged.

Cumulative Socio-Economic Effects with Heathrow Third Runway

16.11.18 The proposed development of the Heathrow Third Runway is considered as a cumulative development as part of this socio-economic assessment.

16.11.19 The implications of Heathrow expansion regarding labour supply and housing demand have been assessed as part of the Assessment of Population and Housing Effects (Appendix 16.6.2). This outlines that between the impact zones of Heathrow and Gatwick defined for assessing these effects, there is only overlap of one authority, namely Elmbridge Borough in Surrey. The assessment concludes that the labour supply generated by current housing trajectories and the labour supply needed to support forecast job growth for Elmbridge shows that there is expected to be a surplus of labour supply of up to c.2,000 in the early 2020s falling to around 500-1,000 by the early 2030s and falling to below 500 in the longer term (but not falling below zero).

16.11.20 In addition, the Population and Housing Effects report highlights that there is a significant amount of 'headroom' in the labour supply in the local authority where there is an overlap between the two airport areas (Elmbridge) and in the housing market area in which that authority sits (North East Surrey). As such, the expansion at Heathrow Airport would need to generate labour demand in excess of c.2,500 workers in Elmbridge alone in order for there to be any potential imbalance in labour supply and demand resulting from both the Project and future expansion at Heathrow.

16.11.21 Moreover, it is expected that the labour supply generated by current housing trajectories represents a 'worst-case scenario' because in the future local plans will be updated and expected housing delivery will increase (as a result of the standard method). As a result, the labour supply generated in the study area will also be increased providing additional 'headroom' in the surplus labour supply of the North East Surrey housing market area. On this basis, it is unlikely that the Project and the expansion of Heathrow will place significant pressures on the housing and labour market of the overlapping areas.

16.11.22 Furthermore, it is not expected to have any additional impacts of scale able to impact the assessment's findings regarding the rest of the operational effects including economy, businesses and community facilities.

16.11.23 Overall, the cumulative effects with Heathrow Third Runway would not change the findings of the assessment across all the phases.

16.12. Inter-Related Effects

16.12.1 The socio-economic effects are not anticipated to have inter-relationships with topics that have not been included within the assessment section.

16.13. Summary

16.13.1 This chapter includes a preliminary assessment of the environmental effects of the Project relating to employment, supply chain, labour market, business disruption, business displacement, population, housing, resident disruption, community facilities and services and community cohesion during construction and operation. The assessment has been conducted following a

combination of Government guidance and professional judgement to develop robust conclusions on the significance of effects based on information available at the time of writing.

16.13.2 The receptors include businesses and commercial activity, labour market, existing and new residents and community assets. These are expected to be impacted upon by multiple factors including direct and indirect employment change, the introduction of a temporary construction workforce and disruption to businesses and residents.

16.13.3 The assessment shows that the Project would generate additional construction jobs which can be filled by the existing and projected labour supply within the labour market area. The Project is expected to generate some disruption to business and residents (eg through changes to traffic and noise levels); however, no significant impacts are expected in most cases. The Project is not expected to increase the need for housing above what is already planned for by neighbouring local authorities.

16.13.4 Some significant effects have been identified including beneficial effects through the generation of construction and operational employment across the four different phases of this socio-economic assessment. In particular, within the local study area the Project has been assessed to have a significant effect on the employment at the interim assessment and final design years. There is also a significant effect identified on the supply chain employment opportunities in the opening year. Some of these effects will be subject to further enhancement measures which will be outlined in further detail at the ES stage.

16.13.5 There are also some significant adverse effects identified by the assessment. The first relates to the loss of Open Space (ie less than one hectare of open space) and measures including re-provision of the entire loss and further enhancements to the rest of the open space provision are expected to mitigate the effect. The second relates to Business Disruption within the site boundary during the interim year. Mitigation measures will include a detailed construction management plan and a compensation schedule that will address and minimise those impacts. Finally, there are moderate adverse effects on labour market in the local study area identified in the interim assessment and design years. These effects will be mitigated by the Outline Employment, Skills and Business Strategy. All the significant adverse effects, following mitigation will have non-significant residual effects.

Next Steps

16.13.6 The assessment in this chapter was prepared using the best information available at the time. Further work will be undertaken following this assessment to inform the final ES chapter for the application of development consent. This work will include continuing to update the baseline socio-economics statistics to align with the latest data sources, revising the assessment around new information (eg updated construction workforce details) and developing the details of mitigation measures such as the Outline Employment, Skills and Business Strategy. Additional consultation will be undertaken with stakeholders to further inform the final ES chapter.

Table 16.13.1: Summary of Effects

Receptor	Study Area	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
Initial Construction Phase (Construction Effects): 2024 to 2029								
Employment	Local study area	Medium	Direct construction employment	Medium-term	High beneficial	Moderate to major beneficial	Significant	
	Labour market area	Low	Direct construction employment	Medium-term	Low beneficial	Minor beneficial	Not significant	
	Five authorities' area	Low	Direct construction employment	Medium-term	Low beneficial	Minor beneficial	Not significant	
Construction supply chain	Local study area	Medium	Indirect economic activity	Medium-term	Low beneficial	Minor beneficial	Not significant	
	Labour market area	Low	Indirect economic activity	Medium-term	Low beneficial	Minor beneficial	Not significant	
	Five authorities' area	Low	Indirect economic activity	Medium-term	Low beneficial	Minor beneficial	Not significant	
Construction labour market	Local study area	Medium	Demand for construction labour, training opportunities and access to work	Medium-term	Low beneficial	Minor beneficial	Not significant	
	Labour market area	Low	Demand for construction labour, training opportunities and access to work	Medium-term	Negligible	Negligible	Not significant	

Receptor	Study Area	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
	Five authorities' area	Low	Demand for construction labour, training opportunities and access to work	Medium-term	Negligible	Negligible	Not significant	
Businesses	Project site boundary	High	Disruption to business activities	Medium-term	Low adverse	Minor adverse	Not significant	
	Local study area	Low - medium	Disruption to business activities	Medium-term	Low adverse	Minor adverse	Not significant	
	Labour market area	Low	Disruption to business activities	Medium-term	Negligible	Negligible	Not significant	
	Five authorities' area	Low	Disruption to business activities	Medium-term	Negligible	Negligible	Not significant	
Businesses	Project site boundary	Low	Displacement of business activities	Permanent	Negligible	Negligible	Not significant	
	Local study area	Negligible	Displacement of business activities	Permanent	Negligible	Negligible	Not significant	
	Labour market area	Negligible	Displacement of business activities	Permanent	Negligible	Negligible	Not significant	
Population	Local study area	Low	Introduction of a temporary workforce	Medium-term	Negligible	Negligible	Not significant	
	Labour market area	Negligible	Introduction of a temporary workforce	Medium-term	Negligible	Negligible	Not significant	
Housing	Local study area	Low	Introduction of a temporary workforce	Medium-term	Negligible	Negligible	Not significant	

Receptor	Study Area	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
	Labour market area	Negligible	Introduction of a temporary workforce	Medium-term	Negligible	Negligible	Not significant	
Existing residents	Local study area	Low	Disruption of existing resident activities	Medium-term	Low adverse	Negligible	Not significant	
	Labour market area	Negligible	Disruption of existing resident activities	Medium-term	Negligible	Negligible	Not significant	
Community facilities and services	Project site boundary	Low	Introduction of a temporary workforce	Medium-term	Medium adverse	Minor adverse	Not significant	
	Local study area	Low	Introduction of a temporary workforce	Medium-term	Medium adverse	Minor adverse	Not significant	
Community cohesion	Project site boundary	Medium	Introduction of a temporary workforce	Medium-term	Low adverse	Minor adverse	Not significant	
	Local study area	Medium	Introduction of a temporary workforce	Medium-term	Low adverse	Minor adverse	Not significant	
2029: First Full Year of Opening (Construction Phase 2029 - 2032)								
Employment	Local study area	Medium	Direct construction employment	Short-term	Medium beneficial	Moderate beneficial	Significant	
	Labour market area	Low	Direct construction employment	Short-term	Low beneficial	Minor beneficial	Not significant	
	Five authorities' area	Low	Direct construction employment	Short-term	Low beneficial	Minor beneficial	Not significant	
Construction supply chain	Local study area	Medium	Indirect economic activity	Short-term	Low beneficial	Minor beneficial	Not significant	

Receptor	Study Area	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
	Labour market area	Low	Indirect economic activity	Short-term	Negligible	Negligible to minor beneficial	Not significant	
	Five authorities' area	Low	Indirect economic activity	Short-term	Negligible	Negligible to minor beneficial	Not significant	
Construction labour market	Local study area	Medium	Demand for construction labour, training opportunities and access to work	Short-term	Low beneficial	Minor beneficial	Not significant	
	Labour market area	Low	Demand for construction labour, training opportunities and access to work	Short-term	Negligible	Negligible	Not significant	
	Five authorities' area	Low	Demand for construction labour, training opportunities and access to work	Short-term	Negligible	Negligible	Not significant	
Businesses	Project site boundary	High	Disruption to business activities	Short-term	Low adverse	Minor adverse	Not significant	
	Local study area	Low - medium	Disruption to business activities	Short-term	Low adverse	Minor adverse	Not significant	
	Labour market area	Low	Disruption to business activities	Short-term	Negligible	Negligible	Not significant	
	Five authorities' area	Low	Disruption to business activities	Short-term	Negligible	Negligible	Not significant	

Receptor	Study Area	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
Businesses	Project site boundary	Low	Displacement of business activities	Permanent	Negligible	Negligible	Not significant	
	Local study area	Negligible	Displacement of business activities	Permanent	Negligible	Negligible	Not significant	
	Labour market area	Negligible	Displacement of business activities	Permanent	Negligible	Negligible	Not significant	
Population	Local study area	Low	Introduction of a temporary workforce	Short-term	Negligible	Negligible	Not significant	
	Labour market area	Negligible	Introduction of a temporary workforce	Short-term	Negligible	Negligible	Not significant	
Housing	Local study area	Low	Introduction of a temporary workforce	Short-term	Negligible	Negligible	Not significant	
	Labour market area	Negligible	Introduction of a temporary workforce	Short-term	Negligible	Negligible	Not significant	
Existing residents	Local study area	Low	Disruption of existing resident activities	Short-term	Low to medium adverse	Negligible to minor adverse	Not significant	
	Labour market area	Negligible	Disruption of existing resident activities	Short-term	Negligible	Negligible	Not significant	
Community facilities and services	Project site boundary	Low	Introduction of a temporary workforce	Short-term	Medium adverse	Minor adverse	Not significant	
	Local study area	Low	Introduction of a temporary workforce	Short-term	Medium adverse	Minor adverse	Not significant	

Receptor	Study Area	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
Open Space – Riverside Garden Park	Project site boundary	High	Loss of Open Space	Permanent	Medium adverse	Moderate Adverse	Significant	
	Local study area	High	Loss of Open Space	Permanent	Low adverse	Minor adverse	Not significant	
Community cohesion	Project site boundary	Medium	Introduction of a temporary workforce	Short-term	Low adverse	Minor adverse	Not significant	
	Local study area	Medium	Introduction of a temporary workforce	Short-term	Low adverse	Minor adverse	Not significant	
2029: First Full Year of Opening (Operational Phase)								
Employment	Local study area	Medium	Introduction of new permanent direct jobs and GVA	Permanent	Low beneficial	Minor beneficial	Not significant	
	Labour market area	Low	Introduction of new permanent direct jobs and GVA	Permanent	Negligible	Negligible to Minor beneficial	Not significant	
	Five authorities' area	Low	Introduction of new permanent direct jobs and GVA	Permanent	Negligible	Negligible to Minor beneficial	Not significant	
Supply chain	Local study area	Medium	Introduction of new indirect and catalytic jobs and GVA	Permanent	Medium beneficial	Moderate beneficial	Significant	
	Labour market area	Low	Introduction of new indirect and catalytic jobs and GVA	Permanent	Low beneficial	Minor beneficial	Not significant	

Receptor	Study Area	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
	Five authorities' area	Low	Introduction of new indirect and catalytic jobs and GVA	Permanent	Low beneficial	Minor beneficial	Not significant	
Labour Market	Local study area	Medium	Demand for labour, new training opportunities and improved access to work	Permanent	Negligible	Negligible	Not significant	
	Labour market area	Low	Demand for labour, new training opportunities and improved access to work	Permanent	Negligible	Negligible	Not significant	
	Five authorities' area	Low	Demand for labour, new training opportunities and improved access to work	Permanent	Negligible	Negligible	Not significant	
Businesses	Project site boundary	High	Driver delays – Business disruptions	Permanent	Low adverse	Minor adverse	Not significant	
	Local study area	Medium-low	Driver delays – Business disruptions	Permanent	Low adverse	Negligible	Not significant	
	Labour market area	Low	Driver delays – Business disruptions	Permanent	No change	No change	Not significant	
Businesses	Project site boundary	Low	Displacement of business activities	Permanent	Negligible	Negligible	Not significant	

Receptor	Study Area	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
	Local study area	Negligible	Displacement of business activities	Permanent	Negligible	Negligible	Not significant	
	Labour market area	Negligible	Displacement of business activities	Permanent	Negligible	Negligible	Not significant	
Population	Local study area	Low	Change in the number of residents	Permanent	Negligible	Negligible	Not significant	
	Labour market area	Negligible	Change in the number of residents	Permanent	Negligible	Negligible	Not significant	
Housing	Local study area	Low	Change in demand for housing	Permanent	Negligible	Negligible	Not significant	
	Labour market area	Negligible	Change in demand for housing	Permanent	Negligible	Negligible	Not significant	
Existing residents	Local study area	Low	Severance, driver delays, pedestrian and cyclist delays and noise	Permanent	Low Adverse	Negligible to minor adverse	Not significant	
	Labour market area	Negligible	Severance, driver delays, pedestrian and cyclist delays and noise	Permanent	Negligible	Negligible	Not significant	
	Project site boundary	Low	Change in demand, supply and viability	Permanent	Negligible	Negligible	Not significant	

Receptor	Study Area	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
Community facilities and services	Local study area	Medium	Change in demand, supply and viability	Permanent	Low	Minor adverse	Not significant	
Community cohesion	Project site boundary	Negligible	Changes to community assets	Permanent	Negligible	Negligible	Not significant	
	Local study area	Low	Changes to community assets	Permanent	Negligible	Negligible to minor adverse	Not significant	
2032: Interim Assessment Year (Construction Phase: 2032 to 2037)								
Employment	Local study area	Medium	Direct construction employment	Medium-term	Low beneficial	Minor beneficial	Not significant	
	Labour market area	Low	Direct construction employment	Medium-term	Low beneficial	Negligible to minor beneficial	Not significant	
	Five authorities' area	Low	Direct construction employment	Medium-term	Low beneficial	Negligible to minor beneficial	Not significant	
Construction supply chain	Local study area	Medium	Indirect economic activity	Medium-term	Low beneficial	Minor beneficial	Not significant	
	Labour market area	Low	Indirect economic activity	Medium-term	Negligible	Negligible to Minor beneficial	Not significant	
	Five authorities' area	Low	Indirect economic activity	Medium-term	Negligible	Negligible to Minor beneficial	Not significant	
Construction labour market	Local study area	Medium	Demand for construction labour, training	Medium-term	Low beneficial	Minor beneficial	Not significant	

Receptor	Study Area	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
			opportunities and access to work					
	Labour market area	Low	Demand for construction labour, training opportunities and access to work	Medium-term	Negligible	Negligible	Not significant	
	Five authorities' area	Low	Demand for construction labour, training opportunities and access to work	Medium-term	Negligible	Negligible	Not significant	
Businesses	Project site boundary	High	Driver delays – Business disruptions	Medium-term	Medium Adverse	Moderate adverse	Significant	
	Local study area	Medium-low	Driver delays – Business disruptions	Medium-term	Medium Adverse	Minor adverse	Not significant	
	Labour market area	Low	Driver delays – Business disruptions	Medium-term	Low Adverse	Negligible	Not significant	
Businesses	Project site boundary	Low	Displacement of business activities	Permanent	Negligible	Negligible	Not significant	
	Local study area	Negligible	Displacement of business activities	Permanent	Negligible	Negligible	Not significant	
	Labour market area	Negligible	Displacement of business activities	Permanent	Negligible	Negligible	Not significant	
Population	Local study area	Low	Introduction of a temporary workforce	Medium-term	Negligible	Negligible	Not significant	

Receptor	Study Area	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
	Labour market area	Negligible	Introduction of a temporary workforce	Medium-term	Negligible	Negligible	Not significant	
Housing	Local study area	Low	Introduction of a temporary workforce	Medium-term	Negligible	Negligible	Not significant	
	Labour market area	Negligible	Introduction of a temporary workforce	Medium-term	Negligible	Negligible	Not significant	
Existing residents	Local study area	Low	Severance, driver delays, pedestrian and cyclist delays and noise	Permanent	Low to Medium Adverse	Minor adverse	Not significant	
	Labour market area	Negligible	Severance, driver delays, pedestrian and cyclist delays and noise	Permanent	Negligible	Negligible	Not significant	
Community facilities and services	Project site boundary	Low	Introduction of a temporary workforce	Short-term	Medium adverse	Minor adverse	Not significant	
	Local study area	Low	Introduction of a temporary workforce	Short-term	Medium adverse	Minor adverse	Not significant	
Community Cohesion	Project site boundary	Medium	Introduction of a temporary workforce	Short-term	Low adverse	Minor adverse	Not significant	
	Local study area	Medium	Introduction of a temporary workforce	Short-term	Low adverse	Minor adverse	Not significant	

Receptor	Study Area	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
2032: Interim Assessment Year (Operational Phase)								
Employment	Local study area	Medium	Introduction of new permanent direct jobs and GVA	Permanent	Medium beneficial	Moderate beneficial	Significant	
	Labour market area	Low	Introduction of new permanent direct jobs and GVA	Permanent	Low beneficial	Negligible to minor beneficial	Not significant	
	Five authorities' area	Low	Introduction of new permanent direct jobs and GVA	Permanent	Low beneficial	Negligible to minor beneficial	Not significant	
Supply chain	Local study area	Medium	Introduction of new indirect and catalytic jobs and GVA	Permanent	High beneficial	Moderate to major beneficial	Significant	
	Labour market area	Low	Introduction of new indirect and catalytic jobs and GVA	Permanent	Medium beneficial	Minor beneficial	Not significant	
	Five authorities' area	Low	Introduction of new indirect and catalytic jobs and GVA	Permanent	Medium beneficial	Minor beneficial	Not significant	
Labour market	Local study area	Medium	Demand for labour, new training opportunities and improved access to work	Permanent	Medium adverse	Moderate adverse	Significant	

Receptor	Study Area	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
	Labour market area	Low	Demand for labour, new training opportunities and improved access to work	Permanent	Low adverse	Minor adverse	Not significant	
	Five authorities' area	Low	Demand for labour, new training opportunities and improved access to work	Permanent	Low adverse	Minor adverse	Not significant	
Businesses	Project site boundary	High	Business disruption - Driver delays	Permanent	Low to medium adverse	Moderate adverse	Significant	
	Local study area	Medium-low	Business disruption - Driver delays	Permanent	Low adverse	Minor adverse	Not significant	
	Labour market area	Low	Business disruption - Driver delays	Permanent	No change	No change	Not significant	
Businesses	Project site boundary	Low	Displacement of business activities	Permanent	Negligible	Negligible	Not significant	
	Local study area	Negligible	Displacement of business activities	Permanent	Negligible	Negligible	Not significant	
	Labour market area	Negligible	Displacement of business activities	Permanent	Negligible	Negligible	Not significant	
Population	Local study area	Low	Change in the number of residents	Permanent	Negligible	Negligible	Not significant	

Receptor	Study Area	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
	Labour market area	Negligible	Change in the number of residents	Permanent	Negligible	Negligible	Not significant	
Housing	Local study area	Negligible	Change in demand for housing	Permanent	Negligible	Negligible	Not significant	
	Labour market area	Negligible	Change in demand for housing	Permanent	Negligible	Negligible	Not significant	
Existing residents	Project site boundary	Negligible	Severance, driver delays, pedestrian and cyclist delays and noise	Permanent	Negligible	Negligible	Not significant	
	Local study area	Low-medium	Severance, driver delays, pedestrian and cyclist delays and noise	Permanent	Medium Adverse	Minor adverse	Not significant	
	Labour market area	Negligible	Severance, driver delays, pedestrian and cyclist delays and noise	Permanent	Negligible	Negligible	Not significant	
Community Facilities and Services	Project site boundary	Low	Change in demand, supply and viability	Permanent	Negligible	Negligible	Not significant	
	Local study area	Medium	Change in demand, supply and viability	Permanent	Negligible	Minor adverse	Not significant	
Community cohesion	Project site boundary	Negligible	Changes to community assets	Permanent	Negligible	Negligible	Not significant	
	Local study area	Low	Changes to community assets	Permanent	Negligible	Negligible to Minor adverse	Not significant	

Receptor	Study Area	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
2038: Design Year (Operational Phase)								
Employment	Local study area	Medium	Introduction of new permanent direct jobs and GVA	Permanent	Medium beneficial	Moderate beneficial	Significant	
	Labour market area	Low	Introduction of new permanent direct jobs and GVA	Permanent	Low beneficial	Negligible to minor beneficial	Not significant	
	Five authorities' area	Low	Introduction of new permanent direct jobs and GVA	Permanent	Low beneficial	Negligible to minor beneficial	Not significant	
Supply chain	Local study area	Medium	Introduction of new indirect and catalytic jobs and GVA	Permanent	High beneficial	Moderate to major beneficial	Significant	
	Labour market area	Low	Introduction of new indirect and catalytic jobs and GVA	Permanent	Medium beneficial	Minor beneficial	Not significant	
	Five authoritie's area	Low	Introduction of new indirect and catalytic jobs and GVA	Permanent	Medium beneficial	Minor beneficial	Not significant	
Labour market	Local study area	Medium	Demand for labour, new training opportunities and improved access to work	Permanent	Medium adverse	Moderate adverse	Significant	

Receptor	Study Area	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
	Labour market area	Low	Demand for labour, new training opportunities and improved access to work	Permanent	Low adverse	Minor adverse	Not significant	
	Five authorities' area	Low	Demand for labour, new training opportunities and improved access to work	Permanent	Low adverse	Minor adverse	Not significant	
Businesses	No business disruption impact in the Design Year is expected as Project will have been completed.							
Businesses	No business displacement impact in the Design Year is expected as Project will have been completed.							
Population	Local study area	Low	Change in the number of residents	Permanent	Negligible	Negligible	Not significant	
	Labour market area	Negligible	Change in the number of residents	Permanent	Negligible	Negligible	Not significant	
Housing	Local study area	Negligible	Change in demand for housing	Permanent	Negligible	Negligible	Not significant	
	Labour market area	Negligible	Change in demand for housing	Permanent	Negligible	Negligible	Not significant	
Existing Residents	Project site boundary	Negligible	Severance, driver delays, pedestrian and cyclist delays and noise	Permanent	Negligible	Negligible	Not significant	
	Local study area	Low	Severance, driver delays, pedestrian and cyclist delays and noise	Permanent	Medium Adverse	Minor adverse	Not significant	

Receptor	Study Area	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
	Labour market area	Negligible	Severance, driver delays, pedestrian and cyclist delays and noise	Permanent	Negligible	Negligible	Not significant	
Community facilities and services	Project site boundary	Low	Change in demand, supply and viability	Permanent	Negligible	Negligible	Not significant	
	Local study area	Medium	Change in demand, supply and viability	Permanent	Negligible	Minor adverse	Not significant	
Community cohesion	Project site boundary	Negligible	Changes to community assets	Permanent	Negligible	Negligible	Not significant	
	Local study area	Low	Changes to community assets	Permanent	Negligible	Minor adverse	Not significant	

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16.15. Glossary

Table 16.15.1: Glossary of Terms

Term	Description
APS	Annual Population Survey
BRES	Business Register and Employment Survey
CEA	Cumulative Effects Assessment
CITB	Construction Industry Training Board
CoCP	Code of Construction Practice
DMRB	Design Manual for Roads and Bridges
EIA	Environmental Impact Assessment
EqIA	Equalities Impact Assessment
ES	Environmental Statement
FDI	Foreign Direct Investment
FEMA	Functional Economic Market Area
FTE	Full Time Equivalent
GP	General Practitioner
GVA	Gross Value Added
HMA	Housing Market Area
IMD	Indices of Multiple Depreviation
LEP	Local Enterprise Partnership
LIS	Local Industrial Strategy
LSOA	Lower Super Output Area
MHCLG	Ministry of Housing, Communities and Local Government
MSOA	Middle Super Output Area
MYE	Mid-Year Estimates
NHS	National Health Service
NPPF	National Planning Policy Framework
NPPG	National Planning Practice Guidance
NPS	National Policy Statement
NVQ	National Vocational Qualification
OA	Output Area
ONS	Office for National Statistics
PEIR	Preliminary Environmental Information Report
PINS	Planning Inspectorate
SNPP	Sub National Population Projections
SOC	Standard Occupational Classification
sqft	Square foot
TTWA	Travel-to-Work Area

Term	Description
ZoI	Zone of Influence

Preliminary Environmental Information Report
Chapter 17: Health and Wellbeing

September 2021

Table of Contents

17 Health and Wellbeing

17.1. Introduction

17.1.1 This chapter of the Preliminary Environmental Information Report (PEIR) presents the findings of the Environmental Impact Assessment (EIA) work undertaken to date concerning the potential effects of the proposal to make best use of Gatwick's existing runways (referred to within this report as 'the Project') on health and wellbeing.

17.1.2 The chapter draws from and builds upon Chapter 5: Project Description and the other relevant technical chapters within the PEIR (most notably: Chapter 12: Traffic and Transport; Chapter 13: Air Quality; Chapter 14: Noise and Vibration; and Chapter 16: Socio-economic Effects) which provide the basis of the assessment of the effects on health and wellbeing. For the sake of brevity, this chapter does not repeat text or replicate data from the inter-related technical disciplines.

17.1.3 For the purposes of this chapter, health is defined as '*a state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity'* (WHO, 1948). As such, this chapter applies a broad socio-economic model of health that encompasses conventional health impacts such as disease, accidents and risks, along with wider socio-economic health determinants important to achieving good health and wellbeing.

17.1.4 In particular, this PEIR chapter:

- sets out the existing and future environmental baseline conditions established from desk studies and consultation with health stakeholders to date;
- presents the potential environmental and socio-economic effects on health and wellbeing arising from the Project, based on the information gathered and analysis and assessments undertaken to date;
- identifies any assumptions and limitations encountered in compiling the information; and
- highlights any necessary monitoring and/or mitigation measures that could prevent, minimise, reduce or offset possible adverse effects or enhance possible beneficial effects identified in the EIA process.

17.1.5 This chapter is accompanied by:

- Appendix 17.2.1: Summary of Local Planning Policy: Health and Wellbeing;
- Appendix 17.3.1: Summary of Stakeholder Consultation; and
- Appendix 17.6.1: Health and Wellbeing Baseline Conditions.

17.1.6 The PEIR will inform pre-application consultation. Following consultation, comments on the PEIR will be reviewed and taken into account in preparation of the Environmental Statement (ES) that will accompany the application to the Planning Inspectorate for development consent.

17.2. Legislation and Policy

Legislation

17.2.1 The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (as amended) (the EIA Regulations) set out, at Regulation 5(2) and Schedule 4, the topics to be assessed within the EIA process, including:

'(2) The EIA must identify, describe and assess in an appropriate manner, in light of each individual case, the direct and indirect significant effects of the proposed development on the following factors –

(a) population and human health;…' (Regulation 5(2))

17.2.2 There is no other relevant legislation applicable to this chapter.

Planning Policy Context

National Policy Statements

17.2.3 The Airports National Policy Statement (NPS) (Department for Transport, 2018a), although primarily provided in relation to a new runway at Heathrow Airport, remains a relevant consideration for other applications for airport infrastructure in London and the south east of England.

17.2.4 The NPS for National Networks (Department for Transport, 2015) sets out the need for development of road, rail and strategic rail freight interchange projects on the national networks and the policy against which decisions on major road and rail projects will be made[1]. This has been taken into account in relation to the highways improvements proposed as part of the Project.

17.2.5 Table 17.2.1 provides a summary of the relevant requirements of these NPSs and how these are addressed within the PEIR.

Table 17.2.1: Summary of NPS Information Relevant to this Chapter

Summary of NPS requirement	How and where considered in the PEIR
Airports NPS	
A project level Health Impact Assessment is required (paragraph 1.37)	In the absence of any explicit guidance relating to the assessment of health in EIA, the assessment included within this chapter applies recognised Health Impact Assessment (HIA) guidance and combines this with the regulatory requirements defined for EIA to investigate,

[1] It is noted that the Transport Decarbonisation Plan published by Department for Transport (DfT) on 14 July 2021 announced DfT's intention to review the NPS for National Networks in due course once demand patterns post-pandemic become clearer. It is understood DfT intends to commence the review by the end of 2021 and complete it by Spring 2023. In the interim and whilst the review is undertaken, DfT has confirmed the NPS for National Networks remains relevant government policy and has full force and effect for the purposes of the Planning Act 2008

Summary of NPS requirement	How and where considered in the PEIR
	inform, assess and effectively communicate how and where all health issues and opportunities are addressed.
The application should include and propose health mitigation, which seeks to maximise the health benefits of the scheme and mitigate any negative health impacts (paragraph 1.37)	The approach draws from and builds upon mitigation outlined by the inter-related technical disciplines to not only reduce any potentially adverse impacts, but also enhance health and wellbeing opportunities where possible. Any recommended mitigation or enhancement measures will seek to support the delivery of local health objectives. Mitigation measures included as part of the Project are set out in Section 17.8.
Where the proposed project has likely significant environmental impacts that would have an effect on human beings, any environmental statement should identify and set out the assessment of any likely significant health impacts (paragraph 4.72).	This has been addressed through the provision of this health and wellbeing PEIR chapter and will be considered further through the ongoing EIA and consultation process prior to the final submission.
The applicant should identify measures to avoid, reduce or compensate for adverse health impacts as appropriate. These impacts may affect people simultaneously, so the applicant, the Examining Authority and the Secretary of State (in determining an application for development consent) should consider the cumulative impact on health (Paragraph 4.73).	The approach draws from and builds upon the inter-related technical disciplines to consider all tangible environmental and socio-economic changes and activities with the potential to influence health and wellbeing, including cumulative effects. Mitigation measures are set out in Section 17.8.
National Networks NPS	
Where the proposed project has likely significant environmental impacts that would have an effect on human beings, any environmental statement should identify and set out the assessment of any likely significant adverse health impacts (paragraph 4.81)	This has been addressed through the provision of this Health and Wellbeing chapter and will be considered further through the ongoing EIA and consultation process prior to the final submission.
The applicant should identify measures to avoid, reduce or compensate for adverse health impacts as appropriate. These impacts may affect people simultaneously, so the applicant, and the Secretary of State (in determining an application for development consent) should consider the cumulative impact on health (paragraph 4.82).	The approach draws from and builds upon the inter-related technical disciplines to consider all tangible environmental and socio-economic changes and activities with the potential to influence health and wellbeing, including cumulative effects. Mitigation measures are set out in Section 17.8.

National Planning Policy Framework

17.2.6 The National Planning Policy Framework (NPPF) (Ministry of Housing, Communities and Local Government, 2021) sets out the planning policies for England. Promoting healthy and safe communities is a central theme, whereby the NPPF states that planning policies and decisions

should aim to achieve healthy, inclusive and safe places which promote social interaction (including opportunities for meetings between people who might not otherwise come into contact with each other), are safe and accessible, and enable and support healthy lifestyles (paragraph 92).

17.2.7 The National Planning Practice Guidance (NPPG) (Ministry of Housing, Communities and Local Government, 2019) supports the NPPF and provides guidance across a range of topic areas, including 'healthy and safe communities'. As stated in the NPPG, planning and health need to be considered firstly in terms of creating environments that support and encourage healthy lifestyles, and secondly in terms of healthcare capacity. In addition, engagement with individuals and/or organisations, such as the relevant Director(s) of Public Health, will help ensure local public health strategies and any inequalities are considered appropriately.

Other Relevant National Planning Policy

Aviation Policy Framework (2013)

17.2.8 While the Aviation Policy Framework (Department for Transport, 2013) does not include health and wellbeing as a specific focus area, its protection remains an important consideration throughout, via commitments to mitigate environmental health determinants (namely air quality and noise), which act as precursors to health and wellbeing outcomes.

17.2.9 In terms of air pollution from aviation activities and associated transport movements, the government's objective is to meet relevant legal obligations to ensure appropriate health protection. In addition, through the government's commitment to mitigate climate change impacts associated with carbon dioxide (CO_2) emissions, there would be a consequent reduction in non-CO_2 emissions (such as oxides of nitrogen (NO_x)) which are hazardous to human health but more poorly understood as climate change contributors.

17.2.10 Regarding noise, the government seeks to strike a balance between the negative impacts of noise, such as on health and wellbeing, and the positive economic impacts of aviation. A general principle is to ensure that benefits from future growth are shared between the aviation industry and local communities. As such, the industry should continue to reduce and mitigate noise as airport capacity grows, with the government's policy on aviation noise consistent with agreed international approaches and relevant European laws.

17.2.11 For night-time noise specifically, the government recognises the health costs associated with sleep disturbance, but also that certain types of flights, which are valuable to the UK economy, may only be viable if they operate during the night-time period. As such, there is an expectation that the aviation industry will make extra efforts to reduce and mitigate noise from night flights and voluntary approaches are commended.

Aviation Strategy (Green Paper): Aviation 2050 – The Future of UK Aviation Policy (2019)

17.2.12 One of the objectives of the Aviation Strategy to 2050 and beyond (Department for Transport, 2018b) is to support growth while tackling environmental impacts. While the primary focus of environmental-related strategy is on addressing carbon emissions, air quality and noise, the protection of health and wellbeing is a key factor. As set out above, commitments to mitigate environmental health determinants act as precursors to health and wellbeing outcomes.

17.2.13 The government recognises air pollution as the top environmental risk to health in the UK and is therefore aiming to improve air quality. Specifically, the Clean Air Strategy (Defra, 2019) sets out the ambition to reduce the harm to health from air pollution by half. Of particular concern are levels of nitrogen oxides. While concentrations have improved in recent years, compliance with ambient air quality legislation remains challenging in some areas of the UK. Pollutants associated with aviation come from airborne aircraft, from 'airside' operations such as taxiing and airside equipment, and from passengers and staff (and other airport users) travelling to and from airports. As the largest source of air pollution is from users of the airport travelling to and from airports, action taken to address potential health effects from air quality should focus on surface access strategies and airport transport forums.

17.2.14 The government also recognises that disturbance from aircraft noise has negative impacts on health and wellbeing, and that the public are particularly sensitive to aircraft noise exposure, as opposed to noise exposure associated with other modes of transport.

17.2.15 The government intends to set a new objective to limit aviation noise to reduce total adverse effects on health and wellbeing. While the government agrees with the ambition to reduce noise as detailed within the World Health Organization (WHO) environmental noise guidelines for the European region (WHO, 2018), the government wants to ensure any policy is underpinned by the most robust evidence on these effects, including the total cost of action and recent UK specific evidence which the WHO report did not assess.

Local Planning Policy

17.2.16 Gatwick Airport is located in the county of West Sussex and immediately adjacent to the bordering county of Surrey to the north. The airport lies within the administrative area of Crawley Borough Council and adjacent to the boundaries of Mole Valley District Council to the north west, Reigate and Banstead Borough Council to the north east and Horsham District Council to the south west. The administrative area of Tandridge District Council is located approximately 1.9 km to the east of Gatwick Airport, while Mid Sussex District Council lies approximately 2 km to the south east.

17.2.17 The relevant local planning policies specific to health and wellbeing based on the extent of the study area for this assessment are summarised in Table 17.2.2. Further details are provided in Appendix 17.2.1.

Table 17.2.2: Local Planning Policy

Administrative Area	Plan	Policy
Adopted Policy		
Crawley Borough Council	Crawley 2030: Crawley Borough Local Plan 2015-2030 (2015)	Policy ENV10: Pollution Management and Land Contamination
		Policy ENV11: Development & Noise
		Policy GAT1: Development of the Airport with a Single Runway

Administrative Area	Plan	Policy
Reigate and Banstead Borough Council	Reigate and Banstead Local Plan Development Management Plan 2018-2027 (2019)	Policy DES9: Pollution and contaminated land
	Reigate and Banstead Local Plan: Core Strategy 2014	Policy CS5: Valued People & Economic Development
Horsham District Council	Horsham District Planning Framework (excluding South Downs National Park)	Policy 24: Environmental Protection
Mid Sussex District Council	Mid Sussex District Plan 2014-2031 (2018)	Policy DP24: Leisure, Cultural & Recreational Activities
		Policy DP25: Community Facilities & Local Services
		Policy DP29: Noise, Air and Light Pollution
Tandridge District Council	Tandridge District Core Strategy (2008)	No local policies directly applicable to health and wellbeing
Emerging Policy		
Crawley Borough Council	Draft Crawley Borough Local Plan 2021-2037 (2021)	Policy SD2: Enabling Healthy Lifestyles and Wellbeing
		Policy GAT1: Development of the Airport with a Single Runway
		Policy EP3: Pollution Management and Land Contamination
		Policy EP4: Development and Noise
		Policy EP5: Air Quality
Tandridge District Council	Our Local Plan 2033 (Regulation 22 Submission) (2019)	Policy TLP17: Health and Wellbeing
		Policy TLP46: Pollution and Air Quality
Horsham District Council	Draft Horsham District Local Plan 2019-2036 (2020)	Policy 25 - Strategic Policy: Environmental Protection
		Policy 32 - Local Greenspace
		Strategic Policy 45: Inclusive Communities, Health and Wellbeing
Mole Valley	Future Mole Valley 2018-2033: Consultation Draft Local Plan (2020)	EN5: Inclusive Environment
		EN13: Promoting Environmental Quality
		INF1: Promoting Sustainable Transport and Parking

17.3. Consultation and Engagement

17.3.1 In September 2019 GAL submitted a Scoping Report to the Planning Inspectorate which described the scope and methodology for the technical studies being undertaken to provide an assessment of any likely significant effects and, where necessary, to determine suitable mitigation measures for the construction and operational phases of the Project. It also described those topics or sub-topics, which are proposed to be scoped out of the EIA process and provided

justification as to why the Project would not have the potential to give rise to significant environmental effects in these areas.

17.3.2 Following consultation with the statutory bodies, the Planning Inspectorate (on behalf of the Secretary of State) provided a Scoping Opinion on 11 October 2019.

17.3.3 Key issues raised during the scoping process specific to health and wellbeing are listed in Table 17.3.1, together with details of how these have been addressed within the PEIR. Further details of individual consultee scoping responses are provided in Appendix 17.3.1.

Table 17.3.1: Summary of Scoping Responses

Reference	Details	How/where addressed in the PEIR
Planning Inspectorate: 11 October 2019		
4.11.1	The Scoping Report states that the majority of the operational workforce would originate from within the region, with no material change in demography or associated health care requirements. However, the Inspectorate does not agree that population impacts (ie change in local demography) should be scoped out during construction or operation, on which basis the Inspectorate also does not agree that health effects arising from population change should be scoped out.	Changes in local healthcare capacity associated with population changes are discussed in Section 17.9 and will be explored in greater detail within the ES following further consideration regarding health service provision.
4.11.2	The Inspectorate agrees that, as any electricity supply infrastructure for the Proposed Development would be compliant by design, and within guideline exposure levels set to protect public health, electric and magnetic field (EMF) risk is unlikely to result in significant effects and can be scoped out of the ES. However, the Inspectorate welcomes the commitment that EMF concerns should be addressed if raised during consultation.	A 'Risk Perception' section, which addresses health effects from EMF, has been provided at the end of Section 17.9 to address any potential key areas of concern.
4.11.3	The Inspectorate agrees that the effects of climate change can be scoped out of the health assessment as they will be addressed within the Climate Change and Carbon chapter of the ES, but would expect to see adequate cross-referencing and signposting to the matter within the health chapter of the ES.	Effects of climate change are addressed in Chapter 15: Climate Change and Carbon with cross references made in other chapters, where required.

Reference	Details	How/where addressed in the PEIR
4.11.4	The Inspectorate is content that any effects from major accidents can be scoped out of the health and wellbeing assessment, as they will be considered as part of the assessment of Major Accidents and Disasters. The Inspectorate is also content that the risk of transmission of communicable diseases can be scoped out, as it is managed through International Health Regulations. However, the Inspectorate advises that the ES provides an explanation of how the risk is to be controlled. A statement was made in the Scoping Report that impacts of changes to Public Safety Zones will be addressed in the section on Major Accidents and Disasters. However, there was no reference to assessing such changes in the Major Accidents and Disasters section of the Scoping Report. As such, the Inspectorate does not agree that risks from changes to Public Safety Zones can be scoped out of the ES.	It is noted that the Inspectorate is content that any effects from major accidents can be scoped out of the health and wellbeing assessment on the basis that this is covered in Appendix 5.3.3 (Major Accidents and Disasters). Regarding risk of transmission of communicable diseases, further explanation of the management of this issue, through International Health Regulations, is provided in the Risk Perception sub-section of Section 17.9. Effects in relation to Public Safety Zones will be considered once the outcome of the Civil Aviation Authority's consultation on standardising Public Safety Zones is known.
4.11.5	The Inspectorate agrees that the commitments to ensuring control of pests should be sufficient to ensure significant effects on public health are unlikely and can be scoped out. However, the Inspectorate advises that the ES contains a summary of this matter and an explanation of the measures to be provided in the Code of Construction Practice.	Appendix 5.3.1 (Outline Code of Construction Practice), sets out the measures that GAL and its contractors would be required to implement for all construction activities associated with the Project. These measures have been identified during the design of the Project and as part of the EIA process. They include strategies, control measures and monitoring procedures, for managing the potential environmental impacts during the construction phase and limiting disturbance from construction activities as far as reasonably practicable, including pest control (Section 5.6).
4.11.6	Despite the implementation of the lighting strategy, the scale and location of any requisite lighting had not yet been determined during scoping. The Inspectorate does not consider it possible to rule out any likely significant effects on health from the impact of light pollution without this information and	Potential health effects from permanent lighting associated with design and temporary construction lighting required to provide a safe and appropriate working environment, are addressed in Section 17.9.

Reference	Details	How/where addressed in the PEIR
	therefore, does not agree that this can be scoped out.	
4.11.7	The Inspectorate agrees that operational effects on staff wellbeing can be scoped out of the ES as this will be managed in accordance with existing procedures and would be regulated by the Health and Safety at Work Act. However, the Inspectorate advises that the ES contains a summary of existing procedures to provide assurances that there would be no likely significant effect.	Occupational health is covered within Section 17.9. It is recognised that, while this is covered under the Health and Safety at Work Act 1974, existing and future occupational health provision will be explored further at the ES stage.
4.11.8	The Inspectorate advises that the health and wellbeing assessment methodology is discussed and agreed with relevant consultation bodies, prior to the commencement of the assessment.	A health forum has been set up with representatives from West Sussex County Council and Surrey County Council, whereby the proposed methodology was discussed. Feedback from the health forum was taken into consideration during the development of the PEIR. There will be continuing engagement with the health forum to test and refine the final ES, and any health-related mitigation and enhancement measures provided.
4.11.9	The Inspectorate acknowledges that the study area will vary depending on the issue being explored (eg air quality or surface transport), but states that the study areas should be sufficiently broad to account for the transient nature of noise, of effects on air and water quality, and vehicle movements. The Applicant is advised to make efforts to agree study areas for these different issues with relevant consultation bodies. It should be clear in the text of the ES, which study area is being applied and a clear cross reference to the relevant sections of other chapters should be made, where relevant.	The study areas are tailored to the individual health determinants investigated. Health determinants such as air quality, noise and socio-economics, include a broad study area to consider the distribution and magnitude of change upon public health. The study area methodology is discussed in more detail in Section 17.4.
4.11.10	The ES should consider not only the effects of safety and community connectivity, but also any likely significant health effects on non-motorised users (for example through losses or changes to public rights of way, open space and the existing road network) and on community severance.	The health and wellbeing assessment (Section 17.9) relating to changes in transport nature and flow rate analyses impacts on: severance; pedestrian and cyclist amenity; and accidents and safety. In addition, a section on health and wellbeing effects from changes to lifestyle factors is included, which addresses the impacts

Reference	Details	How/where addressed in the PEIR
		associated with loss or changes to public rights of way and open space.
4.11.11	For the avoidance of doubt, the Inspectorate considers that impacts on water quality, flood risk and ground conditions should be assessed in the health and wellbeing chapter.	Included within Section 17.9.
4.11.12	The Scoping Report has not identified potential sensitive receptors. These should be identified in the ES, with consideration given to vulnerable groups who might be disproportionately affected by the Proposed Development.	Further detail on the potential sensitive receptors relevant to health and wellbeing, is provided in Section 17.4 where the study area is also discussed in more detail.
4.11.13	The ES should assess the impact on local primary health care, acute services and emergency responders from additional passenger movements, where these are likely to result in significant effects.	Health and wellbeing effects from changes to local healthcare capacity are addressed in Section 17.9.

17.3.4 Key issues raised during consultation and engagement with interested parties specific to health and wellbeing are listed in Table 17.3.2, together with details of how these issues have been addressed within the PEIR.

Table 17.3.2: Summary of Consultation

Consultee	Date	Details	How/where addressed in the PEIR
Local Authority Economics and Employment Topic Working Group			
Representatives from: Crawley; Tandridge; Reigate & Banstead; Mole Valley; West Sussex; Surrey; Horsham; Mid Sussex; and East Sussex.	28 August 2019	Included a presentation on discussion of the proposed scope and methodology of the health and wellbeing chapter.	Session outputs informed and refined the content of the health and wellbeing chapter and helped finalise the purpose of the proposed Health Forum and its participants.
Inaugural Health Forum Meeting			
Representatives from West Sussex County Council and Surrey County Council Public Health Teams.	18 September 2019	Introduced the Project, proposed scope and methodology of the health and wellbeing chapter to the Health Forum made up of key health stakeholders. Discussion focused on: the DCO process; health and wellbeing assessment	Session outputs informed and refined the content of the health and wellbeing chapter, mitigation and support initiatives.

Consultee	Date	Details	How/where addressed in the PEIR
		scope/approach; and local public health circumstance, priorities and need to inform potential mitigation or enhancement measures.	

17.4. Assessment Methodology

Relevant Guidance

17.4.1 The EIA Regulations reinforce the consideration of health within the planning and assessment process, but do not provide definitive guidance on the approach, process or methodology to follow.

17.4.2 Taking this into consideration, it is considered appropriate for the health and wellbeing chapter to apply recognised Health Impact Assessment (HIA) guidance and other relevant guidance, and combine this with the requirements defined for EIA to investigate, inform, assess and effectively communicate how and where all health issues and opportunities are addressed.

17.4.3 The following guidance has been taken into account in undertaking the assessment:

- A Critical Guide to HIA (West Midlands Public Health Observatory, 2007);
- Health Impact Assessment: A practical guide (Chadderton, *et al.,* 2012);
- Fair Society, Healthy Lives: The Marmot Review. Strategic review of health inequalities in England post-2010 (Marmot, *et al.,* 2010);
- Healthy Lives, Healthy People: Our strategy for public health in England (Department of Health, 2010);
- National Planning Practice Guidance: Health and wellbeing (Ministry of Housing, Communities & Local Government, 2019);
- Design Manual for Roads and Bridges (DMRB) LA112: Population and Health (Highways England, 2020a); and
- Reuniting Health with Planning - Healthier Homes, Healthier Communities (Ross & Chang, 2012).

Scope of the Assessment

17.4.4 The scope of this PEIR has been developed in consultation with relevant statutory and non-statutory consultees as set out in Table 17.3.1 and Table 17.3.2. The assessment scope focuses on a range of environmental, social and economic determinants with the potential to influence health and wellbeing, either adversely or beneficially.

17.4.5 Taking into account the scoping and consultation process, Table 17.4.1 summarises the issues considered as part of this assessment.

Table 17.4.1: Issues Considered within the Assessment

Activity	Potential Effects
Construction Phase (including Demolition): Health and Wellbeing	
Construction and demolition activities within existing airport boundary, including construction of upgraded highway junctions and associated changes in surface transport	Environmental (changes in air quality, the water environment, ground conditions, noise and light exposure from construction activities and road traffic).
	Transport (severance, pedestrian/cyclist amenity, risk of accident and injury).
	Lifestyle (access to open space, barriers to physical activity etc.).
	Socio-economic (employment opportunities and associated income generation).
	Impacts on local healthcare capacity from the introduction of a large workforce.
	Health risks from pests.
Operational Phase: Health and Wellbeing	
Use of the airport, including upgraded highway junctions	Environmental (changes in air quality, the water environment, ground conditions, noise and light exposure from operational activities, eg aircraft/support operations/road traffic).
	Transport (severance, pedestrian/cyclist amenity, risk of accident and injury).
	Lifestyle (access to open space, barriers to physical activity etc.).
	Socio-economic (employment opportunities and associated income generation).
	Impacts on local healthcare capacity from changes to the operational workforce and increase in passenger throughput (on Port Health).
	Extended operational hazards (specifically, the risk of transmission of communicable diseases). Changes to Public Safety Zones will be considered once the outcome of the Civil Aviation Authority's consultation on standardising Public Safety Zones is known.

17.4.6 Effects which are not considered likely to be significant have been scoped out of the assessment. A summary of the effects scoped out is presented in Table 17.4.2.

Table 17.4.2: Issues Scoped Out of the Assessment

Issue	Justification
Health and wellbeing effects from exposure to electric and magnetic fields	All overhead power lines, underground cables or substations operating at ≤132 kV are compliant with guideline exposure levels set to protect public health by design. All electricity supply infrastructure for the Project will comply with this guideline exposure limit.
Health and wellbeing effects associated with climate change	Climate change is addressed within Chapter 15: Climate Change and Carbon.

Study Area

17.4.7 The study area presented within the Scoping Report consisted of the local authority districts of Crawley and Reigate and Banstead and was considered suitable for the purposes of profiling the population in the immediate vicinity of the Project. For the purposes of the assessment, this study

area has been reviewed in light of baseline information and likely changes to health determinants outlined by the inter-related technical disciplines. While the local authority districts of Crawley and Reigate and Banstead provide a localised insight to health circumstances, some health determinants would be wider reaching. An updated study area has been applied for 1) environmental health determinants, and 2) socio-economic health determinants, which is described in more detail below.

17.4.8 Environmental health determinants (such as changes to air quality and noise exposure) are likely to have a more local impact where potential change in hazard exposure is limited by physical dispersion characteristics. As a result, the local study area for health-specific baseline statistics relating to population and human health effects focuses on the local authority districts of: Crawley, Reigate and Banstead, Tandridge, Mid Sussex, Horsham and Mole Valley, using regional and national averages as comparators.

17.4.9 The socio-economic health determinant study area remains consistent with the largest study area defined in Chapter 16: Socio-economic Effects, and comprises the County areas of East Sussex, West Sussex, Surrey, Kent and Brighton and Hove ('Five Authorities Area').

17.4.10 The study area defining the relevant sensitive receptors identified for assessment purposes remains consistent with the inter-related technical disciplines assessed within the PEIR, which the health and wellbeing topic relies upon.

Methodology for Baseline Studies

Desk Study

17.4.11 Different communities have varying susceptibility to health and wellbeing effects (both adverse and beneficial) as a result of social and demographic structure, behaviour and relative economic circumstances.

17.4.12 The approach to defining the baseline involved collation and interpretation of published demographic, socio-economic and existing public health and healthcare capacity data. The following open source websites and datasets have been used in order to develop the health and wellbeing baseline:

- Office for National Statistics;
- NOMIS;
- Ministry of Housing, Communities and Local Government;
- Public Health England Fingertips Health Profile Tool;
- Public Health England Local Health Tool;
- NHS Quality Outcomes Framework (QOF) Database; and
- NHS Digital.

17.4.13 In addition, the relevant Joint Strategic Needs Assessment (JSNA) reports have been analysed to provide additional context on local health circumstances, inequalities and public health priorities (health protection, health promotion and health care). These reports partly draw from the open source websites and datasets detailed above.

17.4.14 These baseline data have been used to better understand local health and socio-economic circumstances. Where quantitative assessment methods are being applied, locally specific parameters can be used within equations used to predict changes in baseline population health,

and then assess the significance of an effect. Understanding the existing baseline socio-economic and health status within the study area also supports bespoke mitigation and community support initiatives tailored to local circumstances and need, where appropriate.

Assessment Criteria and Assignment of Significance

17.4.15 The significance of an effect is determined based on the sensitivity of a receptor and the magnitude of an impact. This section describes the criteria applied in this chapter to characterise the sensitivity of receptors and magnitude of potential impacts. The terms used to define magnitude, sensitivity and significance are based on, and have been adapted from, those used in the Design Manual for Roads and Bridges (DMRB) methodology (Highways England *et al*., 2020b), which is described in further detail in Chapter 6: Approach to Environmental Assessment.

Receptor Sensitivity/Value

17.4.16 Within a defined population individuals will range in level of sensitivity due to a series of factors such as age, socio-economic deprivation, and the prevalence of any pre-existing health conditions which could become exacerbated. Sensitive individuals can be considered particularly vulnerable to changes in environmental and socio-economic factors (both adversely and beneficially), whereby they could experience disproportionate effects when compared to the general population.

17.4.17 As an example, the elderly, young children and individuals with chronic pre-existing respiratory conditions would be more sensitive to adverse changes to air quality, with the potential for emergency admission to hospital more likely than for someone of working age who has good respiratory health. On the other hand, an individual who has been unemployed for a long period of time would benefit more from employment opportunities generated by the Project in comparison to an individual who is already employed.

17.4.18 An extensive amount of baseline data has been collected in order to interpret local health circumstances. This information is set out in Appendix 17.6.1: Health and Wellbeing Baseline Conditions and summarised within Section 17.6. Overall, it is concluded that local health circumstances are good. As an example of this conclusion, health deprivation data (provided by the Index of Multiple Deprivation) show that within the local study area, the mean, median and modal deprivation deciles for all Lower Super Output Areas (LSOAs) are 8, 9 and 10 – where 10 represents areas within the least deprived 10% of all LSOAs in England and 1 represents the most deprived 10% of all LSOAs in England.

17.4.19 As such, when looking at the population in general, the existing burden of poor health is low. However, it is recognised that there will be individuals within a defined population who are particularly sensitive and could experience disproportionate effects. On this basis, a precautionary approach has been applied by assuming that the population within the study area is of uniformly high sensitivity.

Magnitude of Impact

17.4.20 The criteria for defining magnitude in this chapter are outlined in Table 17.4.3.

Table 17.4.3: Impact Magnitude Criteria

Magnitude of Impact	Definition
High	Change in environmental or socio-economic factor sufficient to result in a major change in baseline population health or socio-economic circumstance (adverse or beneficial).
Medium	Change in environmental and socio-economic factor sufficient to result in a moderate change in baseline population health or socio-economic circumstance (adverse or beneficial).
Low	Change in environmental and socio-economic factor sufficient to result in a minor change in baseline population health or socio-economic circumstance (adverse or beneficial).
Negligible	Change in environmental and socio-economic factor below that for which it is possible to result in any manifest health outcome at a population level but may impact at an individual level (adverse or beneficial).
No Change	No opportunity for change in health outcome or socio-economic circumstance (adverse or beneficial).

Significance of Effect

17.4.21 The significance of the effect has been determined by taking into account the sensitivity of the receptor and the magnitude of the impact. The method employed for this assessment is presented in Table 17.4.4. Where a range of significance levels are presented, the overall assessment for each effect is based upon expert judgement.

17.4.22 In all cases, a precautionary approach has been applied by applying a uniformly high receptor sensitivity and the evaluation of impact magnitude and significance of effect has been informed by professional judgement and is underpinned by narrative to explain the conclusions reached.

17.4.23 For the purpose of this assessment, any effects with a significance level of minor or less are not considered to be significant in terms of the EIA Regulations.

Table 17.4.4: Assessment Matrix

Sensitivity	Magnitude of Impact				
	No Change	Negligible	Low	Medium	High
Negligible	No change	Negligible	Negligible or Minor	Negligible or Minor	Minor
Low	No change	Negligible or Minor	Negligible or Minor	Minor	Minor or Moderate
Medium	No change	Negligible or Minor	Minor	Moderate	Moderate or Major
High	No change	Minor	Minor or Moderate	Moderate or Major	Major or Substantial
Very high	No change	Minor	Moderate or Major	Major or Substantial	Substantial

17.5. Assumptions and Limitations of the Assessment

17.5.1 The health and wellbeing assessment partially draws from and builds upon the technical outputs from inter-related technical disciplines, namely: Chapter 8: Landscape, Townscape and Visual Resources; Chapter 10: Ground Conditions; Chapter 11: Water Environment; Chapter 12: Traffic and Transport; Chapter 13: Air Quality; Chapter 14: Noise and Vibration; Chapter 16: Socio-economic Effects; and Chapter 18: Agricultural Land Use and Recreation.

17.5.2 As a consequence, the assumptions and limitations of those assessments also apply to any information used in this chapter (eg for modelling work undertaken). However, it is considered that the information available provides a suitable basis for a preliminary assessment of health and wellbeing for the purposes of this PEIR.

17.5.3 This assessment has been based on estimates of how the aircraft fleet will transition over time, based on assumptions around airlines' fleet procurement programmes and business models. The 'central case' used in this assessment is based on what is considered today to be the most likely rate of fleet transition. Any implications of a slower transition fleet will be reviewed for the ES.

17.6. Baseline Environment

Current Baseline Conditions

Introduction

17.6.1 Different communities have varying susceptibilities to health impacts and benefits as a result of social and demographic structure, behaviour and relative economic circumstances.

17.6.2 The aim of the following information, which summarises the more detailed health and wellbeing baseline information provided in Appendix 17.6.1, is primarily to put into context the local health circumstances of the communities within the local and wider study area. It should be recognised that in describing the whole population, and the populations within the local and wider study area, there will be some individuals or groups of people who do not conform to the overall profile. In addition, specific parameters used within quantitative health assessments are referenced towards the end of this section.

17.6.3 Furthermore, baseline environmental conditions referenced in the relevant technical disciplines are used within quantitative health assessments where appropriate. For the sake of brevity, these are not replicated within this section.

Demography, Deprivation and Socio-economic Indicators

17.6.4 The age structure in the local and wider study areas has higher proportions of the population aged 5 to 14 years and 40 to 80+ years, and a lower proportion of the population aged 15 to 34 when compared to the national average. Total population growth in the local and wider study areas between the years of 2011 and 2019 have exceeded the national average by 0.7% and 0.6% respectively.

17.6.5 The local study area is relatively affluent, where for overall deprivation levels there are no Lower Super Output Areas (LSOAs) within the local study area categorised in the 20% most deprived nationally, and 47% of the LSOAs within the local study area are categorised in the 20% least

deprived nationally. For the health domain specifically, there are also no LSOAs within the local study area categorised within the 20% most deprived nationally, and 61% of the LSOAs within the local study area are categorised in the 20% least deprived nationally. The areas with the highest levels of overall deprivation in the local study area are in the south west of Crawley (Southgate and Broadfield areas), with the least deprived areas located in the eastern half of Crawley (Pound Hill, Maidenbower) and in the northern parts of Horley.

17.6.6 For further information on socio-economic circumstances, which are a key determinant of health, refer to Chapter 16: Socio-economic Effects.

Physical and Mental Health Indicators

17.6.7 Male and female life expectancy and healthy life expectancy (ie the amount of years spent in good health) in the local study area are both higher than the regional and national averages. Life expectancy and healthy life expectancy for males and females in the wider study area are also higher than the national average, but are more comparable to the regional average.

17.6.8 All-age all-cause mortality in the local study area is lower than both the regional and national averages; Crawley has the highest all-age all-cause mortality within the local study area. In the wider study area, all-age all-cause mortality is also lower than the national average, but higher than the regional average.

17.6.9 From analysis of under 75 mortality rates for cardiovascular disease and cancer, the under 75 mortality rate within the local study area is consistently below the regional and national averages. Within the wider study area, the under 75 mortality rate for cardiovascular disease and cancer is consistently below the national average and more comparable to the regional average. The under 75 mortality rate for respiratory disease in the local and wider study areas has consistently been below the national average.

17.6.10 Regarding hospital admission rates, emergency hospital admissions for respiratory and cardiovascular diseases in both the local and wider study areas are lower when compared to the national average. This is consistent with mortality trends for cardiovascular and respiratory diseases whereby the under 75 mortality rate within the local and wider study areas are consistently below the national average.

17.6.11 Analysis of indicators relating to mental health, such as suicide rate and hospital stays for self-harm, show slight fluctuations over the years, but a generally improving trend. While hospital stays for self-harm in the wider study area are consistently higher than the regional and national averages, figures for the local study area have decreased over the years to below the regional average, but higher than the national average. Dementia prevalence in the local and wider study areas is marginally higher than the regional and national averages, which is likely to reflect the higher than average age profile.

Lifestyle Indicators

17.6.12 The levels of childhood obesity in the local and wider study areas have remained relatively static over the years and below the regional and national averages. The proportion of the adult population classified as overweight or obese shows a decreasing trend overall in the local study area (between 2015/16 to 2019/20) to a level lower than the regional and national averages – this contrasts with the increasing trends apparent in the wider study area, regionally and nationally. Participation in physical activity in the local and wider study areas has been increasing slightly

over the years and was consistently higher than the regional and national averages until 2018/19, after which figures have decreased to levels more comparable to the national average.

17.6.13 Smoking prevalence in the local and wider study areas have shown a general decrease over the years. While smoking prevalence in the local study area has consistently been lower than both the regional and national averages (from 2016 to 2019), smoking prevalence in the wider study area is consistently higher than the regional average, but more comparable to the national average.

17.6.14 Hospital stays for alcohol-related harm in the local and wider study areas have remained relatively static over the years. In the local and wider study area, hospital stays for alcohol related harm have been consistently lower than the national average. Hospital stays for alcohol related harm in the local study area have also been consistently lower than the regional average. However, this is not the case in the wider study area, where hospital stays for alcohol-related harm have been consistently higher than the regional average.

Baseline Parameters Used for Quantitative Assessment Purposes

17.6.15 While collection and interpretation of a wide range of baseline indicators is useful to put into context the local health circumstances, certain baseline parameters are used directly in quantitative health assessment calculations.

17.6.16 At this stage, a quantitative health assessment has only been completed for predicted changes in air noise exposure. Details of the baseline parameters used in this assessment are outlined in Table 17.6.1.

Table 17.6.1: Baseline Parameters Used in Quantitative Health Assessment for Changes in Noise Exposure

Health Outcome	Local Study Area Average	Source
Hypertension prevalence	13.5%	NHS QOF database
Stroke incidence rate	116.6 per 100,000 population	NHS Digital, Hospital Admitted Patient Care Activity
Stroke mortality rate	36.4 per 100,000 population	NOMIS
Ischaemic Heart Disease (IHD) incidence rate	175.2 per 100,000 population	NHS Digital, Hospital Admitted Patient Care Activity
IHD mortality rate	67.4 per 100,000 population	NOMIS
Depression and anxiety prevalence	11.1%	PHE Mental Health and Wellbeing JSNA Profiles
Dementia prevalence	0.8%	NHS QOF database

17.6.17 The parameters set out in Table 17.6.1 will be updated for the final ES to take into account further quantitative assessment relating to changes in local air quality.

Port Health

17.6.18 Gatwick Airport has a paramedic on-site between the hours of 06.00 and 00.00. The paramedic is supported by 290 staff members who are trained to provide first aid. This figure excludes first aiders, who are also located in every commercial outlet with between 5-50 members of staff. In

addition, there is a total of 56 Automated External Defibrillators (AEDs) located within the airport. As such, the airport is well prepared to respond, treat, and, if required, call for emergency assistance from the South East Coast Ambulance Trust. An example of the existing effectiveness of port health treatment is that AED treatment success rate is more than six times greater than the national average.

17.6.19 Some key port health statistics are provided in Table 17.6.2. From analysis of statistics, while the increase in calls to Gatwick Control Centre between 2015 and 2018 correlates with an increase in passenger throughput per annum, the number of passengers who have been taken to hospital has shown a general decrease and the number of passengers who have continued their journey has increased.

Table 17.6.2: Port Health Statistics

Year	Type of Call and Outcome					Total Passenger numbers (Arr + Dep)
	C1 - Life threatening calls	C3 & First Aid - Non life threatening medical calls	Total medical calls to Gatwick Control Centre	Passengers who continued journey	Passengers dispatched to Hospital	
2015	160	4245	4405	3146	1118	40,010,000
2016	164	4727	4847	3777	1070	42,670,000
2017	177	5116	5295	4173	1121	44,176,000
2018	123	5256	5369	4271	1098	44,786,000

Existing GAL Community Initiatives

17.6.20 GAL operate a range of existing initiatives to share the benefits generated by the airport among local communities by supporting community-related projects and programmes across the region. All community initiatives fall under the following categories: economy; environment; health and wellbeing; education; employment and skills; community investment; or community.

17.6.21 As employment is a key wider determinant of health, GAL's One Destination Employability Programme is particularly beneficial to the health and wellbeing of the local community. The programme constitutes a four-week training course, which is intended to equip long-term unemployed individuals with a range of skills to improve employability. Approximately 92% of those taking the course have been offered employment at the airport.

17.6.22 Healthcare provision is a more direct influencer of health and wellbeing. As such, GAL's support for charity partners such as Air Ambulance Kent Surrey Sussex, St. Catherine's Hospice and Surrey and Sussex Healthcare NHS Trust (amongst others) are relevant. Specifically, during the national lockdowns, GAL supported their charity partners with donations of digital advertising, profits of sales of masks, proceeds of charity collection globes and refreshments for front line workers.

17.6.23 Overall, as health and wellbeing are influenced by several factors, community initiatives falling under all categories supported by GAL will to some extent contribute to improving local health circumstances.

Conclusion

17.6.24 From analysis of available statistics, physical and mental local health circumstance in the local and wider study area can be considered good, and trends are generally positive. In most circumstances, health status is better than the national average and more comparable to the regional average.

17.6.25 On this basis, it is not considered that the local communities living within the study area would be particularly sensitive to socio-economic or environmental changes associated with the construction and operation of the Project.

Future Baseline Conditions

17.6.26 Trends are analysed as part of the current baseline to provide insight into likely future local community circumstances. Overall, data collected show generally positive trends for health-specific data. As it is challenging to predict health-specific data with high confidence, it is considered appropriate and conservative to use present-day statistics for the purpose of this assessment, including assessment for future years.

17.6.27 As population data are used for quantitative health and wellbeing assessment methods, population projection information has been applied within calculations for all relevant assessment years, where possible. In addition, any new residential receptors introduced as a result of other proposed developments in the locality have been captured within modelling outputs from inter-related technical disciplines, which inform the health and wellbeing assessment.

17.6.28 Regarding the potential influence on the health and wellbeing baseline associated with climate change, while it is probable that the effects of climate change will be realised to some extent by the final main assessment year used for the Project (2038), these changes are not expected to materially alter the health and wellbeing baseline conditions.

17.7. Key Project Parameters

17.7.1 The assessment has been based on the parameters identified within Chapter 5: Project Description.

17.7.2 Table 17.7.1 below identifies the key parameters relevant to this assessment. Where options exist, the maximum design scenario selected is the one having the potential to result in the greatest effect on an identified receptor or receptor group. Effects of greater adverse significance are not predicted to arise should any other option identified in Chapter 5 be taken forward in the final design of the Project.

Table 17.7.1: Maximum Design Scenarios

Potential Impact	Maximum Design Scenario	Justification
Initial Construction Phase: 2024-2029		
Changes in local air quality, noise exposure, construction transport and access to open space and public	Maximum design scenarios are specified in Chapter 13: Air Quality, Chapter 14: Noise and Vibration,	The maximum design scenario parameters for each parameter

Potential Impact	Maximum Design Scenario	Justification
rights of way due to on-site construction and associated transport movements	Chapter 12: Traffic and Transport Chapter 18: Agricultural Land Use and Recreation.	have been specified for that assessment.
Construction-related employment opportunities and associated income generation (direct, indirect and catalytic)	Peak construction workforce of approximately 1,300 workers (occurring in October 2026).	Reasonable employment generation predicted by the applicant.
Introduction of a large workforce during construction		Potential adverse social-related health and wellbeing effects based on how the construction workforce is managed.
First Full Year of Opening: 2029, Interim Assessment Year: 2032		
Changes in local air quality, noise exposure, transport and access to open space and public rights of way due to construction/operational activities and associated transport movements	Maximum design scenarios are specified in Chapter 13: Air Quality, Chapter 14: Noise and Vibration, Chapter 12: Traffic and Transport Chapter 18: Agricultural Land Use and Recreation.	The maximum design scenario parameters for each parameter have been specified for that assessment.
Construction and operational-related employment opportunities and associated income generation (direct, indirect and catalytic)	Peak construction workforce of approximately 880 workers (2029), with an average of 600 workers between 2029 and 2032. The peak construction workforce would reduce to 380 workers (between 2032 and 2037). In addition, direct, indirect and catalytic operational employment will increase by 1,000, 1,900 and 3,800 jobs respectively (in 2029) and by 3,200, 6,100 and 11,600 jobs respectively (in 2032).	Reasonable employment generation predicted by the applicant.
Introduction of a large workforce during construction	Peak construction workforce of approximately 880 workers (2029) and 380 workers (between 2032 and 2037).	Potential adverse social-related health and wellbeing effects based on how the construction workforce is managed.
Design Year: 2038		
Changes in local air quality, noise exposure, transport and access to open space and public rights of way	Maximum design scenarios are specified in Chapter 13: Air Quality, Chapter 14: Noise and Vibration, Chapter 12: Traffic and Transport	The maximum design scenario parameters for each parameter have been specified for that assessment.

Potential Impact	Maximum Design Scenario	Justification
due to operational activities and associated transport movements	Chapter 18: Agricultural Land Use and Recreation.	
Operational-related employment opportunities and associated income generation (direct, indirect and catalytic)	Direct, indirect and catalytic employment will increase by 3,200, 6,300 and 10,800 jobs respectively.	Reasonable employment generation predicted by the applicant.

17.8. Mitigation and Enhancement Measures Adopted as Part of the Project

17.8.1 In addition to the existing community initiatives detailed in Section 17.6, which contribute beneficially to local community health circumstances, a number of measures have been designed into the Project to reduce the potential for impacts on health and wellbeing. These are listed below in Table 17.8.1.

Table 17.8.1: Mitigation and Enhancement Measures

Measures Adopted as Part of the Project	Justification
Mitigation	
Generally, mitigation focusses on limiting environmental precursors to preclude adverse health outcomes. As a result, any adopted mitigation measures are detailed within the relevant topic chapters and the Outline Code of Construction Practice (CoCP).	
Health service provision for the construction workforce	As stated in the Outline CoCP, in order to avoid any potential adverse impact on the local health care system, on-site health care would be provided for construction workers. For instance, a health care practitioner would be available for construction workers to consult. The details of this provision will be explored as part of the ES.
Monitoring	
No health specific monitoring is required as environmental monitoring acts as a precursor to, and enables intervention before, any manifestly adverse health outcome. Where relevant, environmental monitoring is described within the relevant topic chapters (air quality, noise transport etc).	
Enhancement	
Outline Employment Skills and Business Strategy (OESBS)	Includes a series of training, employment and procurement initiatives that will aid in addressing existing local barriers to a range of employment opportunities locally. The Outline Employment Skills and Business Strategy (OESBS) is currently under development and will be further informed and refined during the EIA process and submitted as part of the application for development consent.

17.9. Assessment of Effects

Initial Construction Phase: 2024-2029

Health and Wellbeing Effects from Changes to Air Quality

Introduction

17.9.1 The assessment of air quality effects for the initial construction phase (2024-2029) relates specifically to airfield construction activities and establishment of construction compounds. In addition to the potential impacts on air quality from on-site construction activities, air quality modelling results include road traffic sources of air pollution.

Construction Dust

17.9.2 Construction of the Project has the potential to influence health and wellbeing by contributing to nuisance dust emissions (from demolition activities, general on-site construction, earthworks or through trackout[2]). As stated in Chapter 13: Air Quality, following the implementation of appropriate mitigation, the effect from dust on air quality would not be considered significant and therefore it follows that there would be no significant adverse health impacts.

Nitrogen Dioxide and Particulate Matter

17.9.3 During the initial construction phase, no exceedances of air quality objective thresholds are predicted for annual mean particulate matter that is less than or equal to 10 µm in diameter (PM_{10}) or particulate matter that is less than or equal to 2.5 µm in diameter ($PM_{2.5}$) concentrations at any modelled human receptor locations. The annual mean nitrogen dioxide (NO_2) air quality objective threshold is currently exceeded at a total of seven receptor locations, by an average of 3.5 µg/m^3, where the maximum is 49.7 µg/m^3.

17.9.4 As stated in Chapter 13: Air Quality, the largest changes in annual mean concentrations due to the Project in the initial construction phase are predicted to be:

- 0.8 µg/m^3 for NO_2;
- 0.1 µg/m^3 for PM_{10}; and
- 0.1 µg/m^3 for $PM_{2.5}$.

17.9.5 The maximum changes in NO_2, PM_{10} and $PM_{2.5}$ concentrations are not considered significant by air quality standards and annual mean particulate matter would remain within objective thresholds set to be protective of the environment and health. As a result, it is anticipated that the absolute changes in concentration exposure would be below those that would require the quantification of a change in local health outcomes when considering the relevant risk ratios[3] in a quantitative exposure response assessment.

Conclusion

17.9.6 On the above basis, the magnitude of impact of changes in air quality on health and wellbeing during construction is considered to be negligible. In the context of a high sensitivity receptor, the

[2] See Chapter 13: Air Quality for definitions of types of dust effects.
[3] Risk ratios represent the ratio of the probability of an outcome in an exposed group to the probability of an outcome in an unexposed group

resultant effect is considered **minor adverse**, which is not significant in terms of the EIA Regulations.

17.9.7 Data outputs relating to absolute changes in concentration exposure across the local study area will be used to further test this conclusion through a quantitative exposure response assessment at the ES stage. While the quantitative assessment will provide accurate figures upon which to determine the magnitude of impact, the assessment of significance provided above is considered robust.

Health and Wellbeing Effects from Changes in Noise Exposure

Construction Noise

17.9.8 Construction activities taking place during the initial construction phase would occur during the day, evening and night time periods. Adverse changes in noise exposure are likely to be larger at night, reflecting the current expectation that much of the airfield work during this phase would need to be undertaken during the night time period.

17.9.9 As stated in Chapter 14: Noise and Vibration, the communities bordering the airport perimeter with the most potential to experience localised adverse changes in noise exposure during the initial construction phase comprise Charlwood, Hookwood, Horley, Ifield and Lowfield Heath.

17.9.10 An indication of the likely number of households that could be significantly affected by construction noise (with measures adopted as part of the Project, such as noise barriers, in place) is provided in Appendix 14.9.1. Results show that one property in Horley could experience noise levels above the Significant Observed Adverse Effect Level (SOAEL) during the daytime, nine properties in Horley could experience noise levels above the SOAEL during the evening, and 120 properties could experience noise levels above the SOAEL during the night time period (91 in Horley, 14 in Charlwood, ten in Lowfield Heath, four in Hookwood and one in Ilfield). It is expected that further mitigation would be identified and applied to reduce noise levels, including quieter methods of working, reducing plant noise levels for night works near sensitive areas, site perimeter noise barriers and receptor-based mitigation where appropriate (noise insulation and temporary re-housing).

17.9.11 As stated in Chapter 14: Noise and Vibration, the significance of the effects on all communities following mitigation will be assessed in detail at the ES stage when further information on the construction programme, activities to be undertaken and plant likely to be used is known. However, based on the available information at this stage, it is anticipated that some residual noise effects are likely.

17.9.12 A full assessment of noise associated with on-site construction activities will be undertaken and reported in the ES which will inform the health and wellbeing assessment.

Traffic Noise

17.9.13 As stated in Chapter 14: Noise and Vibration, construction traffic on public highways has the potential to create noise disturbance, the extent of which will be determined by the number of receptors along the relevant routes.

17.9.14 It should be noted that it is not proposed to route construction traffic on smaller roads or through villages. However, there would be construction traffic associated with the Project at night during highways works and to support other construction activities being undertaken during the night

time period. As such, general traffic using affected routes may divert to other roads, which may increase noise levels elsewhere.

17.9.15 A full assessment of noise associated with construction traffic will be undertaken and reported in the ES which will inform the health and wellbeing assessment.

Health and Wellbeing Effects from Changes in Transport Nature and Flow Rate

Introduction

17.9.16 As stated in Chapter 12: Traffic and Transport, only airfield construction traffic would be generated by the Project during this phase, and the proposal is for all construction vehicles to travel to and from the airport via M23 Junction 9. The estimated vehicle trip generation is 33 vehicles (Heavy Goods Vehicles (HGVs) and Light Goods Vehicles (LGVs)) in and out per hour along the M23 Spur, and 150 construction worker vehicles in the AM peak hour.

Severance

17.9.17 Community severance can occur when transport infrastructure or motorised traffic acts as a physical or psychological barrier to the movement of pedestrians, which has associated health and wellbeing effects.

17.9.18 As stated in Chapter 12: Traffic and Transport, no road link is expected to experience an increase in overall traffic flows of over 30% (ie the threshold for severance effects) as the result of the Project.

17.9.19 Overall, the increase in HGV traffic flows during the initial construction phase is expected to be localised, with the largest volumes limited to the strategic highway network. In addition, exposure to changes in traffic volume and composition would be low as there are limited pedestrian and cyclist movements expected along construction routes. As a result, the overall magnitude of impact on health and wellbeing from severance would be negligible. In the context of a high sensitivity receptor, the significance of the resultant effect is considered **minor adverse**, which is not significant in terms of the EIA Regulations.

Pedestrian and Cyclist Amenity

17.9.20 As stated in Chapter 12: Traffic and Transport, a doubling of traffic volume or a change in traffic composition can adversely affect pedestrian and cyclist amenity. Any change in pedestrian and cyclist amenity can have associated impacts on health and wellbeing through the modification of healthy behaviour.

17.9.21 However, traffic modelling indicates volumes would not double on any road link analysed. While there would be some change in traffic composition, the percentage of HGVs (number of HGVs divided by total vehicle number) on the road link which experiences the highest increase in traffic flows is 3% for all peak periods (on the A23 London Road, to the south of Longbridge Roundabout) from 4% to 7% in the AM Peak 1 (AM1)[4] and AM Peak 2 (AM2)[5] periods, 6% to 9% in the Interpeak (IP)[6] and 2% to 5% in the PM Peak[7]. In addition, the potential for exposure to

[4] The AM Peak 1 is between 0700 to 0800
[5] The AM Peak 2 is between 0800 to 0900
[6] The Interpeak is the average hour between 0900 and 1600
[7] The PM peak is the average hour between 1600 and 1800, as 1600-1700 and 1700-1800 are very similar in terms of flows

changes in traffic volume and composition is low, as there are limited pedestrian and cyclist movements expected along construction routes.

17.9.22 As a result, the overall magnitude of impact on health and wellbeing from changes in pedestrian and cyclist amenity would be low. In the context of a high sensitivity receptor, the significance of the resultant effect is considered **minor adverse**, which is not significant in terms of the EIA Regulations.

Accidents and Safety

17.9.23 As stated in Chapter 12: Traffic and Transport, suitable measures to minimise the impact of construction-related traffic would be implemented as part of the Construction Traffic Management Plan (CTMP). Following this, the predicted increases in construction-related traffic volumes and composition are not expected to be significant.

17.9.24 As such, the overall magnitude of impact on health and wellbeing from changes in accidents and safety would be negligible. In the context of a high sensitivity receptor, the significance of the resultant effect is considered **minor adverse**, which is not significant in terms of the EIA Regulations.

Health and Wellbeing Effects from Changes in Lifestyle Factors

17.9.25 As stated in Chapter 18: Agricultural Land Use and Recreation, there is the potential for disruption to access along three public rights of way (the Sussex Border Path, public footpath 367Sy and public footpath 359Sy) during the initial construction phase due to commencement of works on the South Terminal roundabout improvements and the associated construction compound, which may be located to the south of the M23 Spur. However, perimeter fencing and a diversion is proposed in order to minimise any temporary adverse impacts, while public access improvements would also be provided to permanently enhance opportunities for physical activity and recreation. Improvement measures include the following:

- Provision of new circular recreational route around the flood compensation area to the east of Museum Field, with a link to the existing alignment of the Sussex Border Path.

17.9.26 Chapter 18: Agricultural Land Use and Recreation provides two significance classifications for the South Terminal roundabout improvements – one for the temporary effects on public rights of way during construction (minor adverse) and another for permanent effects on recreational routes and facilities during operation (minor beneficial).

17.9.27 In addition, there is potential for permanent impacts on recreational resources during the initial construction phase due to the North Terminal roundabout improvements anticipated to commence in 2029. These include the following:

- Permanent loss of approximately 0.75 hectares of public open space along the southern boundary of Riverside Garden Park bringing the highway boundary close to the south eastern corner of the lake and resulting in the loss of mature vegetation along the existing highway embankment which would reduce amenity from visual and acoustic impacts. Overall, it is stated that the loss of land would not adversely affect the integrity of this resource.
- Reduction in the amenity of National Cycle Route 21 within the south eastern corner of Riverside Garden Park and under the existing A23 due to visual impacts.

- Permanent loss of a proportion of a section of the existing Sussex Border Path route to the south of the A23 due to land take for the new junction.

17.9.28 However, the following mitigation measures are incorporated into the Project to minimise any adverse impacts and provide enhancements where practicable:

- Creation of new areas of public open space totalling an area equivalent to or in excess of the total loss of public open space to serve the local community and meet the needs of all users, although these would not be immediately contiguous with the park.
- Improvements/enhancements within Riverside Garden Park in consultation with Reigate and Banstead Borough Council.
- Provision of a permanent and more attractive diversion to the Sussex Border Path prior to the commencement of construction works to maintain access during this phase.
- Provision of a pedestrian link between the footway on the northern side of the A23 footway into Riverside Garden Park.
- Provision of an additional pedestrian route linking Riverside Garden Park with the Sussex Border Path.

17.9.29 Chapter 18: Agricultural Land Use and Recreation provides two significance classifications: one for the adverse long-term loss of land at Riverside Garden Park (moderate adverse) and another for the beneficial changes to the Sussex Border Path (minor beneficial).

17.9.30 In the context of health and wellbeing, temporary adverse changes are unlikely to have a material effect on the basis that the change does not persist and therefore has limited opportunity to influence health and wellbeing. In this case, the temporary adverse change constitutes diversions along two public rights of way and therefore does not remove any opportunity for access to physical activity.

17.9.31 The only permanent adverse changes are associated with the permanent loss of land at Riverside Garden Park and reduction of amenity on National Cycle Route 21 – all other permanent changes are beneficial in nature. In a health and wellbeing context, the permanent loss of land does not remove any opportunity for access to physical activity on the basis that: firstly, the loss of land would not adversely affect the integrity of this resource; and secondly, the creation of public open space would constitute a comparable and accessible alternative. Similarly, while there may be potential for deterrence of use associated with the reduction in amenity on National Cycle Route 21, this does not affect the whole resource and does not remove any opportunity for access to physical activity.

17.9.32 On the basis that all temporary and permanent adverse changes would not have a material impact on health or wellbeing and all other changes are beneficial in nature, the overall magnitude of impact on health and wellbeing from changes in lifestyle factors associated with impacts on public rights of way, recreational routes and facilities would be low. In the context of a high sensitivity receptor, the overall significance of the resultant effect is considered **minor beneficial**, which is not significant in terms of the EIA Regulations.

Health and Wellbeing Effects from Changes in Socio-economic Factors

17.9.33 Having a consistent income and being in long-term employment are two of the most important wider determinants of health. The construction phase of the Project would offer a number of

medium-term job opportunities. While job opportunities would vary in type, the majority of jobs available would be for construction workers.

17.9.34 As stated in Chapter 16: Socio-economic Effects, research by the Construction Industry Training Board (CITB) indicates that the construction industry is highly mobile in nature whereby approximately 48% of construction workers in the south east in 2018/19 travelled at least 50 miles from home to site and, in the same year, 12% of construction workers travelled at least 100 miles from home to site.

17.9.35 Within the initial construction phase, construction employment would increase from around 450 workers (at the start of 2024) to 1,300 workers (in October 2026). Following its peak in October 2026, the number of construction workers would then decrease to around 820 workers. While the demand for direct construction workers would be very large at points during the initial construction phase, it is anticipated that there would be some leakage of associated health and wellbeing benefits from the study area (to areas outside the study area), due to the highly mobile nature of the construction industry.

17.9.36 Regarding indirect employment opportunities generated within the supply chain, while the construction phase is temporary in nature, it is still expected that there would be a sizeable impact on the construction supply chain due to the large scale nature of the Project. However, due to the specialist nature of some of the construction services required for the Project and on the basis that the number of enterprises in the area which could potentially benefit is small, it is unlikely that indirect employment opportunities generated would be captured locally, with leakage of associated health and wellbeing benefits to areas beyond the study area.

17.9.37 Overall, while employment effects would be large in the context of the size of the local study area construction sector, employment opportunities would only be temporary (medium-term at most) and it is anticipated that there would be some leakage of effects outside of the study area due to the highly mobile nature of the construction industry. As a result, the magnitude of impact on local health and wellbeing from employment opportunities would be low. In the context of a high sensitivity receptor, the significance of the resultant effect is considered **minor beneficial**, which is not significant in terms of the EIA Regulations.

Health and Wellbeing Effects from Changes in Exposure to Light

17.9.38 Temporary lighting during construction would be required to provide a safe and appropriate working environment. As stated in Chapter 8: Landscape, Townscape and Visual Resources, lighting would be visible at the following locations/for the following receptors:

- occupiers of the office building at Meadowcroft House; and
- receptors travelling along Balcombe Road.

17.9.39 Occupiers of an office building and transient receptors travelling along Balcombe Road are not considered to be sensitive in a health and wellbeing context as there is no potential for consistent sleep disturbance (which would be the case at residential receptors). At residential receptors, exposure to temporary lighting would be restricted due to their location and because of proposed screening. As a result, there is limited potential for sleep disturbance and consequential effects on health and wellbeing.

17.9.40 On the above basis, the magnitude of impact on health and wellbeing from changes in light exposure would be negligible. In the context of a high sensitivity receptor, the significance of the

resultant effect is considered **minor adverse**, which is not significant in terms of the EIA Regulations.

Health and Wellbeing Effects from Changes to Water Quality, Flood Risk and Ground Conditions

Water Quality and Flood Risk

17.9.41 As stated in Chapter 11: Water Environment, it is considered that there would be impacts on a range of aspects of the water environment during the initial construction phase. However, a number of mitigation measures and best practices would be applied prior to and during construction works to reduce potential impacts on water quality and flood risk to an acceptable level. These measures are described in full in Section 11.8 of Chapter 11: Water Environment and within the Outline CoCP and include the following:

- provision of flood compensation areas to mitigate loss of floodplain storage due to ground raising within the floodplain;
- relocation and reconfiguration of a surface water attenuation facility (Pond A) to ensure no increase in flood risk, including an increase in capacity to account for increases in impermeable surfaces;
- enhancement of the River Mole channel area during realignment works to increase capacity and reduce flood risk;
- provision of syphon connections to maintain floodplain connections on both sides of the taxiway to reduce flood risk;
- installation of a drainage network with flow control arrangements to limit discharges to watercourses and reduce flood risk; and
- provision of a new biochemical oxygen demand discharge control monitoring system to limit discharges of diluted de-icer runoff to the environment.

17.9.42 As a result, the magnitude of impact on health and wellbeing is considered to be negligible. In the context of a high sensitivity receptor, the significance of the resultant effect is considered to be **minor adverse** which is not significant in terms of the EIA Regulations.

Ground Conditions

17.9.43 Construction activities that involve breaking the ground surface and disturbing soil and perched groundwater have the potential to influence human health as a result of exposure to contaminants via a range of exposure modes (dermal contact, ingestion and inhalation).

17.9.44 As stated in Chapter 10: Geology and Ground Conditions, potential areas of concern (PAOC) exist within the Project site, where elevated concentrations of contaminants could exist. In these circumstances, remediation strategies would be developed, as appropriate, following further investigation, to ensure minimal risk to human health. In addition, construction workers would be provided with appropriate protective equipment to limit any temporary exposure.

17.9.45 As a result, the magnitude of impact on health and wellbeing is considered to be negligible. In the context of a high sensitivity receptor, the significance of the resultant effect is considered to be **minor adverse**, which is not significant in terms of the EIA Regulations.

Health and Wellbeing Effects from Changes to Local Healthcare Capacity

Construction Workforce

17.9.46 There would be a peak construction workforce of approximately 1,300 workers during the initial construction phase. As previously stated, it is unlikely that the construction workforce demand would be met wholly by the local population, with a proportion of the construction workforce being made up of individuals commuting from outside the study area due to the highly mobile nature of the construction workforce.

17.9.47 As stated in Chapter 16: Socio-economics, if the peak number of construction workers were to move temporarily to the local study area and labour market area[8] from outside, it would equate to an increase in the local population of around 0.9% which is considered negligible. Furthermore, the peak number of construction workers is lower than the suggested 1,800 registered patients per full-time equivalent GP (based on guidance from the Royal College of GPs (NHS London HUDU, 2009)). This suggests that the hypothetical increase in population would not be sufficient to create demand for an additional GP across the entire labour market area.

17.9.48 While the maximum population increase is anticipated to be negligible and lower than that required to create demand for an additional GP, on-site health care would be provided for construction workers to avoid any potential adverse impact on the local health care system (refer to Outline CoCP). The details of this provision will be explored and further assessed at ES stage.

Further Mitigation

17.9.49 Mitigation measures proposed during the initial construction phase: 2024-2029 focus on limiting environmental precursors to potential health and wellbeing outcomes to levels which are not considered significant. As a result, the measures included within the Project would preclude any significant adverse health and wellbeing effects. No further mitigation or enhancement measures are recommended at this stage.

Future Monitoring

17.9.50 Recommended monitoring focuses on environmental precursors to potential health and wellbeing outcomes. As a result, any recommended monitoring measures relating to health and wellbeing are described within the relevant topic chapters.

Significance of Effects

17.9.51 No further mitigation or monitoring is required; therefore, the significance of effects would remain as presented above.

First Full Year of Opening: 2029

Health and Wellbeing Effects from Changes to Air Quality

Introduction

17.9.52 There are two assessments of air quality effects for the first full year of opening (2029), one of which relates specifically to highway construction impacts and the other of which relates to operational activities. In addition to the potential impacts on air quality from highway construction

[8] The labour market area is defined by Chapter 16: Socio-economics as: Crawley, Mole Valley, Reigate and Banstead, Croydon, Tandridge, Wealden, Lewes, Brighton and Hove, Mid Sussex, Horsham, Eastbourne, Adur, Worthing and Arun

activities and aircraft emissions, air quality modelling results are inclusive of road traffic sources of air pollution.

Construction Scenario – Nitrogen Dioxide and Particulate Matter

17.9.53 In the first full year of opening (2029) construction scenario, no exceedances of air quality objective thresholds are predicted for annual mean NO_2, PM_{10} or $PM_{2.5}$ concentrations at any modelled human receptor locations. As stated in Chapter 13: Air Quality, the largest changes in annual mean concentrations due to the Project in 2029 are predicted to be:

- 1.5 µg/m^3 for NO_2;
- 0.4 µg/m^3 for PM_{10}; and
- 0.2 µg/m^3 for $PM_{2.5}$.

17.9.54 The maximum changes in NO_2, PM_{10} and $PM_{2.5}$ concentrations are not considered significant in terms of air quality standards and would remain within objective thresholds set to be protective of the environment and health. As a result, it is anticipated that the absolute change in concentration exposure would be below that which would require the quantification of a change in local health outcomes when considering the relevant risk ratios in a quantitative exposure response assessment.

17.9.55 On the above basis, the magnitude of impact on health and wellbeing is considered to be negligible. In the context of a high sensitivity receptor, the significance of the resultant effect is considered **minor adverse**, which is not significant in terms of the EIA Regulations.

17.9.56 Data outputs relating to absolute change in concentration exposure across the local study area will be used to further test this conclusion through a quantitative exposure response assessment at the ES stage. While the quantitative assessment will provide accurate figures to assess the magnitude of impact, the assessment of significance provided above is considered robust.
Operational Scenario – Nitrogen Dioxide and Particulate Matter

17.9.57 In the first full year of opening (2029) operational scenario, no exceedances of air quality objective thresholds are predicted for annual mean NO_2, PM_{10} or $PM_{2.5}$ concentrations at any modelled human receptor locations. As stated in Chapter 13: Air Quality, the largest changes in annual mean concentrations due to the Project in 2029 are predicted to be:

- 0.8 µg/m^3 for NO_2;
- 0.2 µg/m^3 for PM_{10}; and
- 0.1 µg/m^3 for $PM_{2.5}$.

17.9.58 The maximum changes in NO_2, PM_{10} and $PM_{2.5}$ concentrations are not considered significant in terms of air quality standards and would remain within objective thresholds set to be protective of the environment and health. As a result, it is anticipated that the absolute changes in concentration exposure would be below those that would require the quantification of a change in local health outcomes when considering the relevant risk ratios in a quantitative exposure response assessment.

17.9.59 On the above basis, the magnitude of impact on health and wellbeing is considered to be negligible. In the context of a high sensitivity receptor, the significance of the resultant effect is considered **minor adverse**, which is not significant in terms of the EIA Regulations. These

conclusions will be further tested through a quantitative exposure response assessment at the ES stage.

Health and Wellbeing Effects from Changes in Noise Exposure

Construction Noise

17.9.60 As stated in Chapter 14: Noise and Vibration, on the basis that construction activities would continue up to 2038, there is the potential for noise-related disturbance during the first full year of opening (2029).

17.9.61 As previously stated, the communities bordering the airport perimeter have the most potential to experience localised adverse changes in noise exposure and the scale of noise impacts is likely to be greater at night, reflecting the current expectation that much of the work would need to be carried out during the night time period.

17.9.62 Horley has the highest potential for adverse changes in noise exposure due to night works required for the highway alterations. Overall, prior to the application of further mitigation measures, there is potential for adverse noise effects at approximately 80 properties during the day and approximately 420 during the night. Following the application of further mitigation measures, the numbers of households affected would be substantially reduced.

17.9.63 As stated in Chapter 14: Noise and Vibration, the significance of effects on all communities following mitigation will be assessed in detail at the ES stage when further information on the construction programme, activities to be undertaken and plant likely to be used is known. However, based on the available information at this stage, it is anticipated that some residual noise effects are likely.

17.9.64 A full assessment of noise associated with on-site construction activities will be undertaken and reported in the ES, which will inform the health and wellbeing assessment.

Air Noise

Introduction

17.9.65 The health and wellbeing assessment relating to changes in exposure to operational air noise is based on exposure-response factors for statistical risks applicable to a large exposed population. Although the changes in noise at most individual receptors over the relevant day and night averaging periods are likely to be small, cumulatively they may be associated with measurable health outcomes at the population level. While some individual receptors would experience larger noise changes which would contribute to the overall health and wellbeing impacts assessed, it should be noted that the probability-based risk factor approach cannot predict effects for particular receptors (which would be affected by an individual's specific circumstances).

17.9.66 In some cases, the health outcome metrics selected for the health and wellbeing assessment may overlap (eg stroke and IHD are potential outcomes of hypertension) or provide more than one estimate for a given health outcome. As such, these results should not be summed; rather, they provide a range of effect estimates, communicating the order of magnitude for likely health effects from changes in noise exposure associated with the Project.

17.9.67 In addition, although there is some evidence that these effects are not confounded by co-exposure to road traffic air pollutants, there is potential for double-counting with the effects of air

pollution exposure quantified above. Caution should therefore be used if summing the air pollution and noise health effects predicted for each assessment scenario.

Results

17.9.68 As stated in Chapter 14: Noise and Vibration, the use of the northern runway is expected to increase beyond 2029. Therefore, the impacts on air noise predicted in 2029 would be lower than in 2032 and beyond. While this is the case, health outcome results relating to changes in exposure to air noise are presented for two scenarios:

- the 2029 with Project scenario, using the present day 2019 air noise baseline as a comparator; and
- the 2029 with Project scenario, using the 2029 air noise future baseline as a comparator.

17.9.69 Table 17.9.1 and Table 17.9.2 show the change in population exposure predicted for each of the air noise contours in the day and night periods, respectively. Details of future changes in noise levels are set out in Chapter 14: Noise and Vibration. In some cases, future improvements in aircraft fleets result in reductions in future noise levels.

Table 17.9.1: Residential Population Noise Exposure During the Day ($L_{eq\ 16\ hour\ Day}$)

Noise Contour (dB)	Assumed Noise Level (dB)	2019 Baseline scenario (no. of people)	2029 Project scenario (no. of people)	Change	2029 Baseline scenario (no. of people)	2029 Project scenario (no. of people)	Change
>51 - 54	52.5	14,200	11,300	-2,900	12,800	11,300	-1,500
>54 - 57	55.5	7,300	6,600	-700	6,200	6,600	400
>57 - 60	58.5	1,100	1,000	-100	900	1,000	100
>60 - 63	61.5	950	600	-350	600	600	0
>63 - 66	64.5	250	400	150	300	400	100
>66 - 69	67.5	150	200	50	100	200	100
>69	70.5	100	0	-100	100	0	-100
Totals		**24,050**	**20,100**	**-3,950**	**21,000**	**20,100**	**-900**

Table 17.9.2: Residential Population Noise Exposure During the Night ($L_{eq\ 8\ hour\ Night}$)

Noise Contour (dB)	Assumed Noise Level (dB)	2019 Baseline scenario (no. of people)	2029 Project scenario (no. of people)	Change	2029 Baseline scenario (no. of people)	2029 Project scenario (no. of people)	Change
>45 - 48	46.5	15,550	13,200	-2,350	13,600	13,200	-400
>48 - 51	49.5	6,550	6,100	-450	5,800	6,100	300
>51 - 54	52.5	4,000	3,000	-1,000	3,000	3,000	0

Noise Contour (dB)	Assumed Noise Level (dB)	2019 Baseline scenario (no. of people)	2029 Project scenario (no. of people)	Change	2029 Baseline scenario (no. of people)	2029 Project scenario (no. of people)	Change
>54 - 55	54.5	300	300	0	300	300	0
>55 - 57	56	500	600	100	500	600	100
>57 - 60	58.5	450	200	-250	200	200	0
>60 - 63	61.5	150	100	-50	100	100	0
>63 - 66	64.5	150	200	50	200	200	0
Totals		**27,650**	**23,700**	**-3,950**	**23,700**	**23,700**	**0**

17.9.70 For the first assessment scenario (2029 with Project when compared to the 2019 baseline), there is a predicted net decrease in population noise exposure during the day time period and no change in population noise exposure during the night time period. Specifically, the only increases in population noise exposure during the day would occur in the >63 – 66 dB and >66 – 69 dB contours (a total of +200 people). All other contours would experience a decrease, including the >69 dB contour where there would be a decrease of approximately 100 people exposed to this level of noise.

17.9.71 During the night time period, the only increases in population noise exposure would occur in the >55 – 57 dB and >63 – 66 dB contours. All other contours would experience no change or a decrease.

17.9.72 For the second assessment scenario (2029 with Project when compared to the 2029 baseline), there would be a net decrease in population noise exposure during the day time period and no change during the night time period. During the day, there would be a decrease in the number of people within the quietest and loudest noise contours (>51 – 54 dB and >69 dB), while the largest increase occurs in the >54 – 57 dB noise contour. During the night time period, there would be a decrease in the number of people within the quietest noise contour (>45 – 48 dB) and no increase in the number of people within five of the remaining seven noise contours, including the three loudest (>51 – 54, >54 – 55, >57 – 60 dB, >60 – 63 dB and >63 – 66 dB).

17.9.73 The health outcome assessment uses current baseline annual disease incidence/prevalence and mortality rates to estimate the change in annual rates of risk factors[9] and health outcomes for the existing population were they to be exposed instantaneously to the predicted changes in long-term noise exposure. Risk factors which are considered in the health outcome assessment include hypertension, annoyance and sleep disturbance.

17.9.74 The results of the health outcome assessment are shown in Table 17.9.3 and Table 17.9.4. Results in Table 17.9.3 are provided for context to the assessment and contribute no weight to the significance conclusion.

[9] Risk factor – defined as any attribute, characteristic or exposure of an individual that increases the likelihood of developing a disease or injury

Table 17.9.3: Noise Exposure Health Parameters (2029 with Project when compared to the 2019 baseline) – Population Attributable Fraction (PAF)

Health Parameter	Estimated number of cases (PAF – 2019 Baseline scenario)	Estimated number of cases (PAF – 2029 with Project scenario)	Total change (PAF – estimated number of cases)
Risk factors			
Hypertension prevalence (a)	81	70	-12
Hypertension prevalence (b)	146	125	-21
Highly annoyed	2,341	1,983	-358
Highly sleep disturbed	1,906	1,631	-275
Health outcomes			
Stroke incidence and mortality	<1	<1	0
CHD incidence	<1	<1	0
IHD incidence and mortality	<1	<1	0
Dementia incidence	<1	<1	0
Depression and anxiety prevalence	101	85	-15

17.9.75 For the first assessment scenario (2029 with Project when compared to the 2019 baseline), it is predicted that there would be a decrease in the number of people experiencing risk factors. In addition, the number of health outcomes prevalent within the population attributable to the Project show either no measurable change or a decrease from the 2019 baseline scenario.

Table 17.9.4: Noise Exposure Health Parameters (2029 with Project when compared to the 2029 baseline) – Population Attributable Fraction

Health Parameter	Estimated number of cases (PAF – 2029 Baseline scenario)	Estimated number of cases (PAF 2029 – with Project scenario)	Total change (PAF – estimated number of cases)
Risk factors			
Hypertension prevalence (a)	69	70	<1
Hypertension prevalence (b)	124	125	<1
Highly annoyed	2,015	1,983	-32
Highly sleep disturbed	1,622	1,631	+10

Health Parameter	Estimated number of cases (PAF – 2029 Baseline scenario)	Estimated number of cases (PAF 2029 – with Project scenario)	Total change (PAF – estimated number of cases)
Health outcomes			
Stroke incidence and mortality	<1	<1	0
CHD incidence	<1	<1	0
IHD incidence and mortality	<1	<1	0
Dementia incidence	<1	<1	0
Depression and anxiety prevalence	87	85	-1

17.9.76 For the second assessment scenario (2029 with Project when compared to the 2029 baseline), all health outcomes analysed show either a minimal or no measurable change or a decrease attributable to the Project.

17.9.77 There is at most a minimal increase in the number of people who are predicted to experience hypertension (a risk factor for a range of health outcomes) and there is a decrease in the number of people who would experience being highly annoyed in the 2029 with Project scenario when compared to the 2029 baseline scenario. Prior to any further mitigation, the only negative outcome is that there is a small increase in the number of people who are highly sleep disturbed (+10), which also constitutes a risk factor for a range of health outcomes.

17.9.78 Overall, the magnitude of impact on health and wellbeing from changes in exposure to air noise would be negligible. In the context of a high sensitivity receptor, the significance of the resultant effect is considered **minor beneficial** (during the day time period) **and minor adverse** (during the night time period), which is not significant in terms of the EIA Regulations. Following submission of the PEIR, it is proposed that the emerging health evidence base will be further reviewed. As a result, the risk ratios applied to the quantitative health and wellbeing air noise assessment may change.

Ground Noise

17.9.79 As stated in Chapter 14: Noise and Vibration, ground noise impacts predicted in the first full year of opening (2029) would be lower than for the interim assessment year (2032), because the use of the northern runway is expected to increase beyond 2029. As per the approach in Chapter 14: Noise and Vibration, the health and wellbeing assessment relating to ground noise focusses on the 2032 assessment year as a worst-case for ground noise.

Traffic Noise

17.9.80 As stated in Chapter 14: Noise and Vibration, construction-related road traffic noise would continue into 2029. The impacts of this have been considered in the initial construction phase assessment.

17.9.81 In addition to construction-related traffic, operational traffic would contribute to the overall effect, which will be assessed in the ES. The outputs from this will inform the health and wellbeing assessment.

Health and Wellbeing Effects from Changes in Transport Nature and Flow Rate

Introduction

17.9.82 As stated in Chapter 12: Traffic and Transport, the annual passenger demand for 2029 is expected to increase from 57.3 million in the 2029 future baseline to 61.3 million with the Project.

Severance

17.9.83 As shown in Chapter 12: Traffic and Transport, only two road links within the whole study area (Old Brighton Road South and Perimeter Road East) would exceed the 30% threshold for potential severance effects during the first full year of opening (2029). All other links would experience a change of less than 30%.

17.9.84 The change in overall traffic flows is predicted to range from -36% (on Perimeter Road East during the PM Peak) to +259% (on Old Brighton Road South during the PM Peak). Regarding HGVs specifically, the change in traffic flows is predicted to range from -25% (on Old Brighton Road South during the AM1 peak) to +44% (on Old Brighton Road South during the PM peak).

17.9.85 Whilst the increase in traffic on both Old Brighton Road and Perimeter Road East would exceed the 30% threshold for potential severance effects, both road links are considered to have low sensitivity in terms of pedestrians and cyclists.

17.9.86 As a result, the overall magnitude of impact on health and wellbeing from severance would be low. In the context of a high sensitivity receptor, the significance of the resultant effect is considered **minor adverse** which is not significant in terms of the EIA Regulations.

Pedestrian and Cyclist Amenity

17.9.87 As stated in Chapter 12: Traffic and Transport, a doubling of traffic volume or a change in traffic composition can adversely affect pedestrian and cyclist amenity.

17.9.88 Old Brighton Road South is expected to experience a doubling of traffic flows in the PM Peak. Regarding traffic composition, the highest increase in the percentage of HGVs (number of HGVs divided by total vehicle number) would be 5% for the PM Peak on Perimeter Road East (from 7% to 12%). Both road links are considered to have a low sensitivity in terms of pedestrians and cyclists.

17.9.89 As a result, the overall magnitude of the impact on health and wellbeing, from changes in pedestrian and cyclist amenity would be negligible. In the context of a high sensitivity receptor, the significance of the resultant effect is considered **minor adverse** which is not significant in terms of the EIA Regulations.

Accidents and Safety

17.9.90 As stated in Chapter 12: Traffic and Transport, the predicted increases in traffic volumes are not expected to be significant and no changes to the highway layouts are proposed.

17.9.91 As such, the overall magnitude of the impact on health and wellbeing from changes in accidents and safety would be negligible. In the context of a high sensitivity receptor, the significance of the resultant effect is considered to be **minor adverse** which is not significant in terms of the EIA Regulations.

Health and Wellbeing Effects from Changes in Lifestyle Factors

17.9.92 As stated in Chapter 18: Agricultural Land Use and Recreation, the North and South Terminal roundabout improvements, which would commence towards the end of the initial construction phase, are anticipated to be completed by 2032. As such, the associated health and wellbeing effects would remain the same (ie minor beneficial and not significant in EIA terms).

17.9.93 Works to the Longbridge Roundabout are anticipated to take place between 2030 and 2032. These may impact on the southern part of areas of public open space at St Bartholomew's Church and the former Horley Anderson Centre and Playing Fields (an approximate area of 0.1 ha). Overall, it is considered that the proposed loss of land would not adversely affect the integrity of this resource. In addition to the permanent loss of land, there may be a permanent reduction in amenity in the southern perimeter areas due to changes in the visual and acoustic environments.

17.9.94 However, the following mitigation measures are incorporated into the Project to minimise any adverse impacts:

- Creation of new areas of public open space (totalling an area equivalent to or in excess of the total loss of public open space) to serve the local community and meet the needs of all users.

17.9.95 In a health and wellbeing context, the permanent loss of amenity land does not remove any opportunity for access to physical activity on the basis that: firstly, the loss of land would not adversely affect the integrity of this resource; and secondly, the creation of new replacement public open space would constitute a comparable and accessible alternative. Similarly, while there may be potential for deterrence of use associated with the reduction in amenity at the southern perimeter areas, this does not affect the whole resource and does not remove any opportunity for access to physical activity.

17.9.96 On the basis that the permanent adverse change described would not have a material impact on health or wellbeing, the overall magnitude of impact on health and wellbeing from changes in lifestyle factors associated with impacts on public rights of way, recreational routes and facilities would be low. In the context of a high sensitivity receptor, the significance of the resultant effect is considered **minor adverse**, which is not significant in terms of the EIA Regulations.

Health and Wellbeing Effects from Changes in Socio-economic Factors

Construction Related Employment

17.9.97 The peak construction workforce between 2029 and 2032 is estimated to be around 880 workers. As the direct construction workforce is expected to decrease from the initial construction phase, the level of related supply chain activity is also likely to decrease. However, overall employment effects would still remain large in the context of the size of the local study area construction sector.

17.9.98 As previously stated, research by the CITB indicates that the construction industry is highly mobile in nature. As a result, it is unlikely that the construction workforce demand would be met wholly by the local population, with a proportion of the construction workforce being made up of individuals with specialist skills commuting from outside the study area.

Operational Related Employment

17.9.99 As stated in Chapter 16: Socio-Economic Effects, within the first full year of opening (2029) the Project would lead to a net increase of approximately 1,000 permanent direct operational related jobs. As a result of the direct operational job opportunities provided, a further 1,900 indirect and 3,800 catalytic job opportunities would be generated further down the supply chain which are anticipated to be captured within the wider study area.

Conclusion

17.9.100 Construction employment opportunities would be temporary (medium-term at most) in nature where the workforce is likely to be highly mobile. Therefore, it is anticipated that there would be leakage of potential health and wellbeing benefits from the local study area (to areas beyond the study area) during the construction phase. However, operational employment opportunities would provide long-term employment where the workforce are likely to reside in the wider study area. As a result, the overall magnitude of impact on health and wellbeing from employment opportunities would be low. In the context of a high sensitivity receptor, the significance of the resultant effect is considered to be **minor beneficial** which is not significant in terms of the EIA Regulations.

Health and Wellbeing Effects from Changes in Exposure to Light

17.9.101 Temporary lighting during construction is required to provide a safe and appropriate working environment. As stated in Chapter 8: Landscape, Townscape and Visual Resources, lighting would be visible at the following locations/for the following receptors:

- public right of way 362a Horley;
- McDonalds and KFC at South Terminal;
- occupiers of the office building at Meadowcroft House; and
- receptors travelling along Balcombe Road.

17.9.102 Occupiers of an office building, customers of the McDonald's and KFC at South Terminal, and transient receptors travelling along public right of way 362a and Balcombe Road Horley are not considered to be sensitive in a health and wellbeing context as there is no potential for consistent sleep disturbance (which would be the case at residential receptors). At residential receptors, exposure to lighting would be restricted due to their location and because of proposed screening. As a result, there is limited potential for sleep disturbance and consequential effects on health and wellbeing.

17.9.103 As a result, the magnitude of impact on health and wellbeing from changes in light exposure would be negligible. In the context of a high sensitivity receptor, the significance of the resultant effect is considered **minor adverse** which is not significant in terms of the EIA Regulations.

Health and Wellbeing Effects from Changes to Water Quality, Flood Risk and Ground Conditions

Water Quality and Flood Risk

17.9.104 As stated in Chapter 11: Water Environment, all of the proposed flood mitigation measures (except for the Gatwick Stream flood compensation area) would have been completed by the first full year of opening (2029). After 2029, the main works that could impact fluvial flood risk would be the proposed surface access improvement works which would include their own mitigation measures and the satellite airfield contractor construction compound, that would encroach on the floodplain, would remain until 2032.

17.9.105 As such, the assessment undertaken for the initial construction phase represents a reasonable worst-case scenario whereby no additional effects are anticipated in the first full year of opening (2029). On this basis, the potential significance of effect on health and wellbeing also remains the same (ie minor adverse and not significant in EIA terms).

Ground Conditions

17.9.106 As stated in Chapter 10: Geology and Ground Conditions, construction within PAOCs is proposed to be ongoing during this period and therefore, the effects remain as described during the initial construction phase (2024-2029). Following the completion of remediation, the magnitude of impact would be negligible.

17.9.107 As a result, the magnitude of impact on health and wellbeing is considered to be negligible. In the context of a high sensitivity receptor, the significance of the resultant effect is considered to be **minor adverse**, which is not significant in terms of the EIA Regulations.

Health and Wellbeing Effects from Changes to Local Healthcare Capacity

Construction Workforce

17.9.108 During the first full year of opening (2029), there would be a peak construction workforce of around 880 personnel. As previously stated, it is unlikely that the construction workforce demand would be met wholly by the local population, with a proportion of the construction workforce being made up of individuals commuting from outside the study area due to the highly mobile nature of the construction industry.

17.9.109 The size of the construction workforce in the first full year of opening (2029) would be less than in the peak year of construction (occurring during the initial construction phase). As a result, even if all construction workers were to move temporarily to the local study area and labour market area from outside, this would equate to a negligible population increase that is lower than that required to create demand for an additional GP.

17.9.110 While this is the case, on-site health care would be provided for construction workers to avoid any potential adverse impact on the local health care system (refer to Outline CoCP). The details of this provision will be explored and further assessed at ES stage.

Port Health

17.9.111 Baseline Port Health statistics are outlined in Section 17.6 and show that while the increase in calls to Gatwick Control Centre between 2015 and 2018 correlates with an increase in passenger throughput per annum, the number of passengers who have been taken to hospital has shown a

general decrease and the number of passengers who have continued their intended journey has increased.

17.9.112 As such, it is clear that the residual impact on external healthcare providers is not solely a function of passenger throughput, as the intervention, triage and care provided can significantly reduce the need for ambulance call outs. At the ES stage, a forecast of Port Health statistics based on passenger throughput in the first full year of opening (2029) will be explored.

Occupational Health

17.9.113 While occupational healthcare for the operational workforce is covered under the Health and Safety at Work Act 1974, existing and future occupational health provision will be explored further at the ES stage.

Conclusion

17.9.114 As a result, the overall magnitude of impact on health and wellbeing from changes to local healthcare capacity would be negligible. In the context of a high sensitivity receptor, the significance of the resultant effect is considered **minor adverse** which is not significant in terms of the EIA Regulations.

Further Mitigation

17.9.115 Mitigation measures proposed during the first full year of opening (2029) focus on limiting environmental precursors to potential health and wellbeing outcomes to a level which is not considered significant. As a result, the measures included within the Project would preclude any significant adverse health and wellbeing effects. No further mitigation or enhancement measures are recommended at this stage.

Future Monitoring

17.9.116 Generally, recommended monitoring focuses on environmental precursors to potential health and wellbeing outcomes. As a result, any recommended monitoring measures relating to health and wellbeing are described within the relevant topic chapters. However, it is anticipated that public health event data and emergency call out rates from Port Health will be made available to the community liaison group to further communicate the measures in place, to protect public health and minimise impacts on local health care providers.

Significance of Effects

17.9.117 No further mitigation or monitoring is required; therefore, the significance of effects would remain as presented above.

Interim Assessment Year: 2032

Health and Wellbeing Effects from Changes to Air Quality

Introduction

17.9.118 The assessment of air quality effects for the interim assessment year (2032) relates to the operational phase only. While construction activities are due to take place up to 2037, the impact on air quality from airfield and highway construction is addressed in the initial construction phase (2024-2029) and first full year of opening (2029) sections above. In addition to the potential

impacts on air quality on aircraft emissions, air quality modelling results are inclusive of road traffic sources of air pollution.

Nitrogen Dioxide and Particulate Matter

17.9.119 In the interim assessment year (2032), no exceedances of air quality objective thresholds are predicted for annual mean NO_2, PM_{10} or $PM_{2.5}$ concentrations at any modelled human receptor locations. As stated in Chapter 13: Air Quality, the largest changes in annual mean concentrations due to the Project in 2029 are predicted to be:

- 1.4 µg/m^3 for NO_2;
- 0.2 µg/m^3 for PM_{10}; and
- 0.1 µg/m^3 for $PM_{2.5}$.

17.9.120 The maximum predicted changes in NO_2, PM_{10} and $PM_{2.5}$ concentrations are not considered significant in terms of air quality standards and would remain within objective thresholds set to be protective of the environment and health. As a result, it is anticipated that the absolute changes in concentration exposure those that would require the quantification of a change in local health outcomes when considering the relevant risk ratios in a quantitative exposure response assessment.

17.9.121 On the above basis, the magnitude of impact on health and wellbeing is considered to be negligible. In the context of a high sensitivity receptor, the significance of the resultant effect is considered **minor adverse** which is not significant in terms of the EIA Regulations.

17.9.122 Data outputs relating to absolute change in concentration exposure across the local study area will be used to further test this conclusion through a quantitative exposure response assessment at the ES stage. While the quantitative assessment will provide accurate figures to assess the magnitude of impact, the assessment of significance provided above is considered robust.

Health and Wellbeing Effects from Changes in Noise Exposure

Air Noise

Noise Health Outcomes for Residential Population

17.9.123 Health outcome results relating to changes in exposure to air noise are presented for two scenarios:

- the 2032 with Project scenario, using the present day 2019 air noise baseline as a comparator; and
- the 2032 with Project scenario, using the 2032 air noise future baseline as a comparator.

17.9.124 Table 17.9.5 and Table 17.9.6 show the change in population exposure predicted for each of the air noise contours in the day and night periods, respectively.

Table 17.9.5: Residential Population Noise Exposure During the Day ($L_{eq\ 16\ hour\ Day}$)

Noise Contour (dB)	Assumed Noise Level (dB)	2019 Baseline scenario (no. of people)	2032 Project scenario (no. of people)	Change	2032 Baseline scenario (no. of people)	2032 Project scenario (no. of people)	Change
>51 - 54	52.5	14,200	9,800	-4,400	9,400	9,800	400
>54 - 57	55.5	7,300	6,800	-500	4,900	6,800	1,900
>57 - 60	58.5	1,100	1,000	-100	900	1,000	100
>60 - 63	61.5	950	700	-250	500	700	200
>63 - 66	64.5	250	300	50	200	300	100
>66 - 69	67.5	150	200	50	100	200	100
>69	70.5	100	0	-100	100	0	-100
Totals		**24,050**	**18,800**	**-5,250**	**16,100**	**18,800**	**2,700**

Table 17.9.6: Residential Population Noise Exposure During the Night ($L_{eq\ 8\ hour\ Night}$)

Noise Contour (dB)	Assumed Noise Level (dB)	2019 Baseline scenario (no. of people)	2032 Project scenario (no. of people)	Change	2032 Baseline scenario (no. of people)	2032 Project scenario (no. of people)	Change
>45 - 48	46.5	15,550	11,700	-3,850	9,900	11,700	1,800
>48 - 51	49.5	6,550	5,500	-1,050	5,300	5,500	200
>51 - 54	52.5	4,000	3,100	-900	2,600	3,100	500
>54 - 55	54.5	300	300	0	100	300	200
>55 - 57	56	500	500	0	400	500	100
>57 - 60	58.5	450	200	-250	200	200	0
>60 - 63	61.5	150	100	-50	200	100	-100
>63 - 66	64.5	150	200	50	100	200	100
Totals		**27,650**	**21,600**	**-6,050**	**18,800**	**21,600**	**2,800**

17.9.125 For the first assessment scenario (2032 with Project when compared to the 2019 baseline), there is a predicted net decrease in population noise exposure during the day and night time periods. Specifically, the only increases in population noise exposure during the day would occur in the >63 – 66 dB and >66 – 69 dB contours (a total of +100 people). All other contours would experience a decrease, including the >69 dB contour where there would be a decrease of approximately 100 people exposed to this level of noise.

17.9.126 During the night time period, the only increase in population noise exposure would occur in the >63 – 66 dB contour. All other contours would experience no change or a decrease. In particular, the >54 – 55 dB and >55 – 57 dB contours experience no increase in population noise exposure.

17.9.127 For the second assessment scenario (2032 with Project when compared to the 2032 baseline), there would be a net increase in population noise exposure during the day and night time periods. During the day, there would be a decrease in the number of people within the loudest noise contour (>69 dB), while the largest increase would occur in the >54 – 57 dB noise contour. During the night time period, there would be no increase in the number of people within the three loudest noise contours (>57 – 60 dB, >60 – 63 dB and >63 – 66 dB), with the largest increase in exposure predicted to occur in the quietest noise contour (>45 – 48 dB).

17.9.128 The health outcome assessment uses current baseline annual disease incidence/prevalence and mortality rates to estimate the change in annual rates of risk factors and health outcomes for the existing population were they to be exposed instantaneously to the predicted changes in long-term noise exposure. Risk factors which are considered in the health outcome assessment include hypertension, annoyance and sleep disturbance.

17.9.129 The results of the health outcome assessment are shown in Table 17.9.7 and Table 17.9.8, respectively. Results in Table 17.9.7 are provided for context to the assessment and contribute no weight to the significance conclusion.

Table 17.9.7: Noise Exposure Health Parameters (2032 with Project when compared to the 2019 baseline) – Population Attributable Fraction (PAF)

Health Parameter	Estimated number of cases (PAF – 2019 Baseline scenario)	Estimated number of cases (PAF – 2032 with Project scenario)	Total change (PAF – estimated number of cases)
Risk factors			
Hypertension prevalence (a)	81	67	-14
Hypertension prevalence (b)	146	120	-25
Highly annoyed	2,341	1,889	-451
Highly sleep disturbed	1,906	1,500	-406
Health outcomes			
Stroke incidence and mortality	<1	<1	0
CHD incidence	<1	<1	0
IHD incidence and mortality	<1	<1	0
Dementia incidence	<1	<1	0
Depression and anxiety prevalence	101	81	-19

17.9.130 For the first assessment scenario (2032 with Project when compared to the 2019 baseline), it is predicted that there would be a decrease in the number of people experiencing all risk factors (ie hypertension, high annoyance and high sleep disturbance). In addition, the number of health outcomes prevalent within the population attributable to the Project shows either no measurable change (for stroke, CHD and IHD health outcomes) or a decrease from the 2019 baseline scenario (for depression and anxiety prevalence).

17.9.131 As previously stated, there would be a net decrease in population noise exposure during the day and night time periods between the 2032 with Project scenario and the 2019 baseline scenario. This is primarily due to changes in the aircraft fleet composition and the introduction of newer and quieter engines. As a result, despite an increase in aircraft movements per annum, the overall effect on noise exposure and consequent health and wellbeing outcomes is anticipated to be beneficial.

Table 17.9.8: Noise Exposure Health Parameters (2032 with Project when compared to the 2032 baseline) – Population Attributable Fraction

Health Parameter	Estimated number of cases (PAF – 2032 Baseline scenario)	Estimated number of cases (PAF 2032 – with Project scenario)	Total change (PAF – estimated number of cases)
Risk factors			
Hypertension prevalence (a)	55	67	+12
Hypertension prevalence (b)	98	120	+22
Highly annoyed	1,579	1,889	+310
Highly sleep disturbed	1,304	1,500	+196
Health outcomes			
Stroke incidence and mortality	<1	<1	0
CHD incidence	<1	<1	0
IHD incidence and mortality	<1	<1	0
Dementia incidence	<1	<1	0
Depression and anxiety prevalence	68	81	+13

17.9.132 For the second assessment scenario (2032 with Project when compared to the 2032 baseline), prior to any further mitigation there is predicted to be a measurable increase in the number of people experiencing changes in risk factors (ie hypertension, high annoyance and high sleep disturbance). However, the change in risk factors is not sufficient to measurably alter the number of stroke, CHD, IHD and dementia health outcomes prevalent within the population attributable to the Project, which all show no change from the 2032 baseline scenario. The only health outcome which shows a measurable increase in the 2032 with Project scenario when compared to the 2032 baseline scenario is depression and anxiety prevalence (+13).

Changes in Noise Exposure at Community Locations

17.9.133 Chapter 14: Noise and Vibration identifies 50 noise sensitive community buildings that are predicted to experience noise levels at or above 51 dB $L_{eq\ 16\ hr}$ in 2032 with the Project. These comprise 23 schools, one hospital, 18 places of worship and eight other community buildings.

17.9.134 At 42 of the noise sensitive community buildings (84%), noise levels are predicted to either decrease or increase by less than 1 dB, which is considered to be a negligible change. The maximum change in noise is predicted to be only slightly more than that considered negligible (+1.3 dB), and would occur at the following sensitive receptors: Scott Broadwood C of E Infant School, RH5 5JX; St John the Baptist's Church, Capel, RH5 7JY; The Chapel, RH6 0DQ; and Capel Village Hall, RH5 5LB. Furthermore, two noise sensitive community buildings (4%), both places of worship, would experience reductions in noise levels.

Significance Conclusion

17.9.135 Overall, the magnitude of impact on health and wellbeing from changes in exposure to air noise would be low. In the context of a high sensitivity receptor, the significance of the resultant effect is considered **minor adverse** which is not significant in terms of the EIA Regulations. Following submission of the PEIR, it is proposed that the emerging health evidence base will be further reviewed. As a result, the risk ratios applied to the quantitative health and wellbeing air noise assessment may change.

Ground Noise

17.9.136 As stated in Chapter 14: Noise and Vibration, noise barriers would be included as mitigation adopted as part of the Project to reduce ground noise. Once mitigation is taken into account, the worst-case increase in noise levels during the daytime period ($L_{eq\ 16\ hr}$) at any receptor location would be +6 dB, with some receptors experiencing a decrease of up to -1 dB. During the night time period ($L_{eq\ 8\ hr}$), the worst-case increase in noise levels at any receptor location would be +4 dB, with some receptors experiencing a decrease of up to -3 dB.

17.9.137 Overall, Chapter 14: Noise and Vibration identifies that predicted ground noise effects would not be significant at the majority of the representative receptors studied (11 out of 12 for daytime noise, and 9 out of 12 for night time noise). Significant effects are identified at one receptor for daytime noise and three receptors for night time.

17.9.138 As stated in Chapter 14: Noise and Vibration, with the Project, there are approximately 10 residential receptors that exceed the SOAEL. The properties where the SOAEL may be exceeded are within or close to the Noise Insulation Scheme Inner Zone boundary. The Inner Zone boundary will be modified as necessary when the assessment is completed, so that significant effects on heath and quality of life are avoided.

17.9.139 On the basis that the Inner Zone boundary would be modified as necessary so that significant effects on health and quality of life would be avoided, the overall magnitude of impact on health and wellbeing would be low. In the context of a high sensitivity receptor, the significance of the resultant effect is considered **minor adverse**, which is not significant in terms of the EIA Regulations.

Traffic Noise

17.9.140 As stated in Chapter 14: Noise and Vibration, noise barriers would be included as mitigation adopted as part of the Project to reduce traffic noise.

17.9.141 Absolute noise levels and changes in noise exposure due to road traffic have been assessed in Chapter 14: Noise and Vibration at a selection of receptor locations, representing the closest nearby communities/dwellings to the Project.

17.9.142 As baseline noise levels at four of the seven receptors analysed were above the SOAEL before considering the change in noise exposure associated with the Project, the change in noise exposure at any given receptor provides more information for use in a health and wellbeing context. Overall, noise reductions are predicted at the majority of receptors, with a worst-case increase in noise exposure of less than 1 dB at any receptor.

17.9.143 As such, the magnitude of impact on health and wellbeing from changes in exposure to traffic noise is low. In the context of a high sensitivity receptor, the significance of the resultant effect is considered **minor adverse**, which is not significant in terms of the EIA Regulations.

Health and Wellbeing Effects from Changes in Transport Nature and Flow Rate

Introduction

17.9.144 As stated in Chapter 12: Traffic and Transport, the annual passenger demand for 2032 is expected to increase from 59.4 million in the future baseline to 72.3 million with the Project.

Severance

17.9.145 As shown in Chapter 12: Traffic and Transport, during the interim assessment year, the change in overall traffic flows is predicted to range from -18% (on Perimeter Road East during the PM Peak) to +254% (on the Old Brighton Road South during the PM Peak). Regarding HGVs, the change in traffic flows is predicted to range from -8% (on A213 Windmill Road) to +300% (on Gatwick Way).

17.9.146 The severance effects reported in Chapter 12: Traffic and Transport on the 14 road links that exceed the 30% threshold for potential severance effects range from minor to moderate adverse. As stated in Chapter 12: Traffic and Transport, most of the road links experiencing a high increase in traffic flows are located in Croydon during the PM Peak; as such, this area will be further reviewed in the modelling work for the final development consent.

17.9.147 All other road links would experience a change in traffic flows below the 30% threshold, whereby the potential effect on severance reported in Chapter 12: Traffic and Transport would range from negligible to minor adverse.

17.9.148 Overall, while some of the road links in the study area would experience a moderate adverse effect, the majority would only experience negligible to minor adverse effects, which would not be significant. As a result, the overall magnitude of impact on health and wellbeing from severance would be low. In the context of a high sensitivity receptor, the significance of the resultant effect is considered **minor adverse**, which is not significant in terms of the EIA Regulations.

Pedestrian and Cyclist Amenity

17.9.149 As stated in Chapter 12: Traffic and Transport, a doubling of traffic volume or a change in traffic composition can adversely affect pedestrian and cyclist amenity.

17.9.150 Old Brighton Road South, Waddon New Road, Reeves Corner and London Road would experience a doubling of traffic flows in the PM Peak. These road links generally have low future baseline traffic flows and their sensitivity in terms of pedestrians and cyclists ranges from low to medium.

17.9.151 Regarding traffic composition, the highest increase in the percentage of HGVs (number of HGVs divided by total vehicle number) would be 10% in the AM1 and AM2 periods and 17% in the PM Peak, both on Northgate Road. However, there is no pedestrian or cyclist facility along Northgate Road and therefore potential exposure to changes is limited.

17.9.152 As a result, the overall magnitude of impact on health and wellbeing from changes in pedestrian and cyclist amenity would be low. In the context of a high sensitivity receptor, the significance of the resultant effect is considered **minor adverse**, which is not significant in terms of the EIA Regulations.

Accidents and Safety

17.9.153 As stated in Chapter 12: Traffic and Transport, the design of the proposed highway improvements would separate through traffic from the North Terminal roundabout. This would reduce traffic flows through the junction and consequent risk of conflict.

17.9.154 As a result, the overall magnitude of impact on health and wellbeing from changes in accidents and safety would be negligible. In the context of a high sensitivity receptor, the significance of the resultant effect is considered **minor adverse/beneficial** which is not significant in terms of the EIA Regulations.

Health and Wellbeing Effects from Changes in Lifestyle Factors

17.9.155 As stated in Chapter 18: Agricultural Land Use and Recreation, no effects on recreational resources are anticipated as a result of the operation of the Project in the interim assessment year (2032). As a result, no further health and wellbeing assessment has been undertaken.

Health and Wellbeing Effects from Changes in Socio-economic Factors

Construction Related Employment

17.9.156 The peak construction workforce between 2032 and 2037 is projected to be approximately 380 workers. As the direct construction workforce is expected to further decrease from the first full year of opening, the level of related supply chain activity is also likely to decrease. However, overall employment effects would still remain large in the context of the size of the local study area construction sector.

17.9.157 As previously stated, research by the CITB indicates that the construction industry workforce is highly mobile in nature. As a result, it is unlikely that the construction workforce demand would be met wholly by the local population, with a proportion of the construction workforce being made up of individuals commuting from outside the study area.

Operational Related Employment

17.9.158 As stated in Chapter 16: Socio-Economic Effects, within the interim assessment year (2032) the Project would lead to a net increase of approximately 3,200 permanent direct operational jobs. As a result of the direct operational job opportunities provided, a further 6,100 indirect and 11,600

catalytic job opportunities would be generated further down the supply chain, which are anticipated to be captured within the wider study area.

Conclusion

17.9.159 Construction employment opportunities would be temporary (medium-term) in nature where the workforce is likely to be highly mobile. Therefore, it is anticipated that there would be leakage of potential health and wellbeing benefits from the study area (to areas outside the study area) during the construction phase. However, operational employment opportunities would provide long-term employment where the workforce is likely to reside in the wider study area. As a result, the overall magnitude of impact on health and wellbeing from employment opportunities would be medium. In the context of a high sensitivity receptor, the significance of the resultant effect is considered **moderate beneficial** which is significant in terms of the EIA Regulations.

Health and Wellbeing Effects from Changes in Exposure to Light

17.9.160 Temporary lighting during construction is required to provide a safe and appropriate working environment. In addition, there would be permanent lighting associated with completion of some infrastructure associated with the operation of the Project.

17.9.161 As stated in Chapter 8: Landscape, Townscape and Visual Resources, lighting would be visible at the following locations/for the following receptors:

- public right of way 362a Horley;
- McDonalds and KFC at South Terminal; and
- occupiers of the office building at Meadowcroft House.

17.9.162 Occupiers of an office building, transient receptors travelling along public right of way 362a Horley and customers of the McDonald's and KFC at South Terminal are not considered to be sensitive in a health and wellbeing context, as there is no potential for consistent sleep disturbance (which would be the case at residential receptors).

17.9.163 As a result, the magnitude of impact on health and wellbeing from changes in light exposure would be negligible. In the context of a high sensitivity receptor, the significance of the resultant effect is considered **minor adverse** which is not significant in terms of the EIA Regulations.

Health and Wellbeing Effects from Changes to Water Quality, Flood Risk and Ground Conditions

Water Quality and Flood Risk

17.9.164 As stated in Chapter 11: Water Environment, the effects of construction works in the watercourses would have stabilised by 2032. Furthermore, all primary works that could affect current flood risk would have been completed by this time, whereby the measures implemented by this stage would be adequate to ensure that no further increase in flood risk would occur. For all remaining activities with the potential to impact water quality (eg creation of Gatwick Stream flood compensation area), the implementation of mitigation measures and best practices would continue to be applied prior to and during construction works to reduce potential impacts on water quality and flood risk to an acceptable level.

17.9.165 As such, the assessment undertaken for the initial construction phase represents a reasonable worst-case scenario, whereby no additional effects are anticipated in the interim assessment year

(2032). On this basis, the potential significance of effect on health and wellbeing would also remain the same (ie **minor adverse** and not significant in terms of the EIA Regulations).

Ground Conditions

17.9.166 As stated in Chapter 10: Geology and Ground Conditions, remediation may be required for the remaining construction areas from 2032 onwards. However, the requirement for remediation is likely to be localised in its extent. In addition, remediation is unlikely to be required in the majority of the remaining construction areas.

17.9.167 As a result, the magnitude of impact on health and wellbeing would be negligible. In the context of a high sensitivity receptor, the significance of the resultant effect is considered to be **minor adverse** which is not significant in terms of the EIA Regulations.

Health and Wellbeing Effects from Changes to Local Healthcare Capacity

Construction Workforce

17.9.168 The peak construction workforce between 2032 and 2037 is projected to be approximately 380 personnel. As previously stated, it is unlikely that the construction workforce demand would be met wholly by the local population, with a proportion of the construction workforce being made up of individuals commuting from outside the study area due to the highly mobile nature of the construction industry.

17.9.169 The size of the construction workforce in the interim assessment year (2032) would be less than in the peak year of construction (occurring during the initial construction phase). As a result, even if all construction workers were to move temporarily to the local study area and labour market area from outside, this would equate to a negligible population increase that is lower than that required to create demand for an additional GP.

17.9.170 While this is the case, on-site health care would be provided for construction workers to avoid any potential adverse impact on the local health care system (refer to the Outline CoCP). The details of this provision will be explored and further assessed at ES stage.

Port Health

17.9.171 As previously stated, baseline Port Health statistics are outlined in Section 17.6 and show that while the increase in calls to Gatwick Control Centre between 2015 and 2018 correlates with an increase in passenger throughput per annum, the number of passengers who have been taken to hospital has shown a general decrease and the number of passengers who have continued their intended journey has increased.

17.9.172 As such, it is clear that the residual impact on external healthcare providers is not solely a function of passenger throughput, as the intervention, triage and care provided can significantly reduce the need for ambulance call outs. At the ES stage, a forecast of Port Health statistics based on passenger throughput in the interim assessment year (2032) will be explored.

Occupational Health

17.9.173 While occupational healthcare for the operational workforce is covered under the Health and Safety at Work Act 1974, existing and future occupational health provision will be explored at the ES stage.

Conclusion

17.9.174 As a result, the overall magnitude of impact on health and wellbeing from changes to local healthcare capacity would be negligible. In the context of a high sensitivity receptor, the significance of the resultant effect is considered **minor adverse**, which is not significant in terms of the EIA Regulations.

Further Mitigation

17.9.175 Mitigation measures proposed during the interim assessment year (2032) focus on limiting environmental precursors to potential health and wellbeing outcomes to a level, which is not considered significant. As a result, the measures proposed as part of the Project would preclude any significant adverse health and wellbeing effects. No further mitigation or enhancement measures are recommended at this stage.

Future Monitoring

17.9.176 Generally, recommended monitoring focuses on environmental precursors to potential health and wellbeing outcomes. As a result, any recommended monitoring measures relating to health and wellbeing are described within the relevant topic chapters. However, it is anticipated that public health event data and emergency call out rates from port health will be made available to the community liaison group to further communicate the measures in place to protect public health and minimise impacts on local health care providers.

Significance of Effects

17.9.177 No further mitigation or monitoring is required; therefore, the significance of effects would remain as presented above.

Design Year: 2038

Health and Wellbeing Effects from Changes to Air Quality

17.9.178 It is anticipated that there will be improvements in background air quality and vehicle emissions in the design year (2038). On this basis, for the purposes of the PEIR, the 2038 design year has been assessed in terms of aircraft emissions and not for road vehicle emissions.

17.9.179 Regarding aircraft emissions, as stated in Chapter 13: Air Quality, the Project would result in an increase in emissions for all sources and pollutants when compared to the 2038 future baseline scenario. However, when comparing the design year (2038) with Project to the interim assessment year (2032) with Project, there is a decrease in the overall airport-related NOx, PM_{10} and $PM_{2.5}$ emissions. This is attributed to the changes in aircraft fleet composition and the introduction of newer and lower emitting engines.

17.9.180 The assessment of health and wellbeing effects from changes in air quality will be revisited at the ES using any further assessment of road traffic emissions for the design year (2038) provided as part of Chapter 13: Air Quality.

Health and Wellbeing Effects from Changes in Noise Exposure

Air Noise

Noise Health Outcomes for Residential Population

17.9.181 Health outcome results relating to changes in exposure to air noise are presented for two scenarios:

- the 2038 with Project scenario, using the present day 2019 air noise baseline as a comparator; and
- the 2038 with Project scenario, using the 2038 air noise future baseline as a comparator.

17.9.182 Table 17.9.9 and Table 17.9.10 show the change in population exposure predicted for each of the air noise contours in the day and night periods, respectively.

Table 17.9.9: Residential Population Noise Exposure During the Day ($L_{eq\ 16\ hour\ Day}$)

Noise Contour (dB)	Assumed Noise Level (dB)	2019 Baseline scenario (no. of people)	2038 Project scenario (no. of people)	Change	2038 Baseline scenario (no. of people)	2038 Project scenario (no. of people)	Change
>51 - 54	52.5	14,200	9,000	-5,200	7,300	9,000	1,700
>54 - 57	55.5	7,300	5,700	-1,600	4,100	5,700	1,600
>57 - 60	58.5	1,100	800	-300	900	800	-100
>60 - 63	61.5	950	500	-450	400	500	100
>63 - 66	64.5	250	300	50	100	300	200
>66 - 69	67.5	150	200	50	100	200	100
>69	70.5	100	0	-100	100	0	-100
Totals		**24,050**	**16,500**	**-7,550**	**13,000**	**16,500**	**3,500**

Table 17.9.10: Residential Population Noise Exposure During the Night ($L_{eq\ 8\ hour\ Night}$)

Noise Contour (dB)	Assumed Noise Level (dB)	2019 Baseline scenario (no. of people)	2038 Project scenario (no. of people)	Change	2038 Baseline scenario (no. of people)	2038 Project scenario (no. of people)	Change
>45 - 48	46.5	15,550	9,400	-6,150	7,600	9,400	1,800
>48 - 51	49.5	6,550	4,900	-1,650	4,800	4,900	100
>51 - 54	52.5	4,000	2,900	-1,100	2,300	2,900	600
>54 - 55	54.5	300	200	-100	200	200	0
>55 - 57	56	500	400	-100	400	400	0
>57 - 60	58.5	450	200	-250	100	200	100

Noise Contour (dB)	Assumed Noise Level (dB)	2019 Baseline scenario (no. of people)	2038 Project scenario (no. of people)	Change	2038 Baseline scenario (no. of people)	2038 Project scenario (no. of people)	Change
>60 - 63	61.5	150	200	50	200	200	0
>63 - 66	64.5	150	100	-50	100	100	0
Totals		**27,650**	**18,300**	**-9,350**	**15,700**	**18,300**	**2,600**

17.9.183 For the first assessment scenario (2038 with Project when compared to the 2019 baseline), there is a predicted net decrease in population noise exposure during the day and night time periods. Specifically, the only increases in population noise exposure during the day would occur in the >63 – 66 dB and >66 – 69 dB contours (a total of +100 people). All other contours would experience a decrease, including the >69 dB contour where there would be a decrease of approximately 100 people exposed to this level of noise.

17.9.184 During the night time period, the only increase in population noise exposure would occur in the >60 – 63 dB contour. All other contours would experience no change or a decrease.

17.9.185 For the second assessment scenario (2038 with Project when compared to the 2038 baseline), there would be a net increase in population noise exposure during the day and night time periods. During the day, there would be a decrease in the number of people within the loudest noise contour (>69 dB), while the largest increase occurs in the quietest noise contour (>51 – 54 dB). During the night time period, there would be no increase in the number of people within the two loudest noise contours (>60 – 63 dB and >63 – 66 dB), with the largest increase in exposure predicted to occur in the quietest noise contour (>45 – 48 dB).

17.9.186 The health outcome assessment uses current baseline annual disease incidence/prevalence and mortality rates to estimate the change in annual rates of risk factors and health outcomes for the existing population were they to be exposed instantaneously to the predicted changes in long-term noise exposure. Risk factors which are considered in the health outcome assessment include hypertension, annoyance and sleep disturbance.

17.9.187 The results of the health outcome assessment are shown in Table 17.9.11 and Table 17.9.12, respectively. Results in Table 17.9.11 are provided for context to the assessment and contribute no weight to the significance conclusion.

Table 17.9.11: Noise Exposure Health Parameters (2038 with Project when compared to the 2019 baseline) – Population Attributable Fraction (PAF)

Health Parameter	Estimated number of cases (PAF – 2019 Baseline scenario)	Estimated number of cases (PAF – 2038 with Project scenario)	Total change (PAF – estimated number of cases)
Risk factors			
Hypertension prevalence (a)	81	58	-23
Hypertension prevalence (b)	146	104	-42
Highly annoyed	2,341	1,641	-700
Highly sleep disturbed	1,906	1,284	-622
Health outcomes			
Stroke incidence and mortality	<1	<1	0
CHD incidence	<1	<1	0
IHD incidence and mortality	<1	<1	0
Dementia incidence	<1	<1	0
Depression and anxiety prevalence	101	71	-30

17.9.188 For the first assessment scenario (2038 with Project when compared to the 2019 baseline), it is predicted that there would be a decrease in the number of people experiencing risk factors. In addition, the number of health outcomes prevalent within the population attributable to the Project show either no change or a decrease from the 2019 baseline scenario.

Table 17.9.12: Noise Exposure Health Parameters (2038 with Project when compared to the 2038 baseline) – Population Attributable Fraction

Health Parameter	Estimated number of cases (PAF – 2038 Baseline scenario)	Estimated number of cases (PAF 2038 – with Project scenario)	Total change (PAF – estimated number of cases)
Risk factors			
Hypertension prevalence (a)	45	58	+12
Hypertension prevalence (b)	81	104	+22
Highly annoyed	1,293	1,641	+348
Highly sleep disturbed	1,108	1,284	+176

Health Parameter	Estimated number of cases (PAF – 2038 Baseline scenario)	Estimated number of cases (PAF 2038 – with Project scenario)	Total change (PAF – estimated number of cases)
Health outcomes			
Stroke incidence and mortality	<1	<1	0
CHD incidence	<1	<1	0
IHD incidence and mortality	<1	<1	0
Dementia incidence	<1	<1	0
Depression and anxiety prevalence	56	71	+15

17.9.189 For the second assessment scenario (2038 with Project using 2038 baseline), prior to any further mitigation, there is predicted to be a measurable increase in the number of people experiencing changes in risk factors (ie hypertension, high annoyance and high sleep disturbance). However, the change in risk factors is not sufficient to measurably alter the number of stroke, CHD, IHD and dementia health outcomes prevalent within the population attributable to the Project. The only health outcome which shows a measurable increase in the 2038 with Project scenario when compared to the 2038 baseline scenario is depression and anxiety prevalence (+15).

17.9.190 Overall, the magnitude of impact on health and wellbeing from changes in exposure to air noise is low. In the context of a high sensitivity receptor, the significance of the resultant effect is considered **minor adverse**, which is not significant in terms of the EIA Regulations. Following submission of the PEIR, it is proposed that the emerging health evidence base will be further reviewed. As a result, the risk ratios applied to the quantitative health and wellbeing air noise assessment may change.

Ground Noise

17.9.191 As stated in Chapter 14: Noise and Vibration, noise barriers would be included as mitigation adopted as part of the Project to reduce ground noise. Once mitigation is taken into account, the worst-case increase in noise levels during the daytime period ($L_{eq\ 16\ hr}$) at any receptor location would be +6 dB, with some receptors experiencing a decrease of up to -2 dB. During the night time period ($L_{eq\ 8\ hr}$), the worst-case increase in noise levels at any receptor location would be +5 dB, with some receptors experiencing a decrease of up to -5 dB.

17.9.192 The worst-case increase in day time noise would be 1 dB higher than for the interim assessment year (2032). However, this predicted change is in the context of lower overall predicted noise levels with the Project in 2038 due to a larger proportion of quieter, next generation aircraft in the fleet.

17.9.193 As per the interim assessment year (2032), on the basis that the Inner Zone boundary would be modified as necessary so that significant effects on health and quality of life are avoided, the overall magnitude of impact on health and wellbeing would be low. In the context of a high sensitivity receptor, the significance of the resultant effect is considered **minor adverse**, which is not significant in terms of the EIA Regulations.

Traffic Noise

17.9.194 As stated in Chapter 14: Noise and Vibration, the DMRB does not require an assessment of road traffic noise in 2038. Instead, road traffic noise 15 years after the opening of the roads associated with the Project (2047) are assessed.

17.9.195 Chapter 14: Noise and Vibration sets out the $L_{A10,18\ hour}$ road traffic noise predictions (with the implementation of noise barrier mitigation) at a selection of receptor locations representing the closest nearby communities/dwellings to the Project.

17.9.196 Comparing the predicted traffic noise levels from the Project in 2047 to the baseline scenario in 2032, reductions are predicted at the majority of residential receptors and in the Riverside Garden Park. Where long term noise does increase, the change would be less than 3 dB, which is considered negligible in noise terms.

17.9.197 As such, the magnitude of impact on health and wellbeing from changes in exposure to traffic noise would be negligible. In the context of a high sensitivity receptor, the significance of the resultant effect is considered **minor adverse**, which is not significant in terms of the EIA Regulations.

Health and Wellbeing Effects from Changes in Transport Nature and Flow Rate

Introduction

17.9.198 Following DRMB guidance, Chapter 12: Traffic and Transport assesses the design year to be 2047. As stated in Chapter 12: Traffic and Transport, the annual passenger demand for 2047 is expected to increase from 67.2 million in the future baseline scenario to 80.2 million with the Project.

Severance

17.9.199 As shown in Chapter 12: Traffic and Transport, during the design year (2047), the change in overall traffic flows is predicted to range from -62% (on Northgate Road during the PM Peak) to +897% (on Perimeter Road East during the PM Peak). Regarding HGVs, the change in traffic flows is predicted to range from 0% (on several road links) to +2217% (on Longbridge Way during the IP peak).

17.9.200 The severance effects reported in Chapter 12: Traffic and Transport on the 16 road links that exceed the 30% threshold for potential severance effects range from negligible to minor adverse. As stated in Chapter 12: Traffic and Transport, the links experiencing the highest increase in traffic flows are associated with the airport access, which are considered to have negligible to low pedestrian and cyclist sensitivity.

17.9.201 All other road links would experience a change in traffic flows below the 30% threshold, whereby the potential effect on severance reported in Chapter 12: Traffic and Transport would also range from negligible to minor adverse.

17.9.202 As a result, the overall magnitude of impact on health and wellbeing from severance would be negligible. In the context of a high sensitivity receptor, the significance of the resultant effect is considered **minor adverse**, which is not significant in terms of the EIA Regulations.

Pedestrian and Cyclist Amenity

17.9.203 As stated in Chapter 12: Traffic and Transport, a doubling of traffic volume or a change in traffic composition can adversely affect pedestrian and cyclist amenity.

17.9.204 Old Brighton Road South, Perimeter Road East, Longbridge Way, Northgate Road, Perimeter Road North and Gatwick Way are expected to experience a doubling in traffic flows. However, these are airport estate roads with negligible to low sensitivity in terms of pedestrians and cyclists.

17.9.205 Regarding traffic composition, the highest increase in the percentage of HGVs (number of HGVs divided by total vehicle number) are also predicted on the airport estate roads with negligible to low sensitivity in terms of pedestrians and cyclists.

17.9.206 As a result, the overall magnitude of impact on health and wellbeing from changes in pedestrian and cyclist amenity would be negligible. In the context of a high sensitivity receptor, the significance of the resultant effect is considered **minor adverse** which is not significant in terms of the EIA Regulations.

Accidents and Safety

17.9.207 As stated in Chapter 12: Traffic and Transport, the design of the proposed highway improvements would separate through traffic from the North Terminal roundabout. This would reduce traffic flows through the junction and consequent risk of conflict.

17.9.208 As a result, the overall magnitude of impact on health and wellbeing from changes in accidents and safety would be negligible. In the context of a high sensitivity receptor, the significance of the resultant effect is considered **minor adverse/beneficial** which is not significant in terms of the EIA Regulations.

Health and Wellbeing Effects from Changes in Lifestyle Factors

17.9.209 As stated in Chapter 18: Agricultural Land Use and Recreation, no effects on recreational resources are anticipated as a result of the operation of the Project in the design year (2038). As a result, no further health and wellbeing assessment has been undertaken.

Health and Wellbeing Effects from Changes in Socio-economic Factors

17.9.210 As stated in Chapter 16: Socio-Economic Effects, within the design year (2038) the Project would lead to a net increase of 3,200 permanent direct operational related jobs. As a result of the direct operational job opportunities provided, a further 6,300 indirect and 10,800 catalytic job opportunities would be generated further down the supply chain, which are anticipated to be captured within the wider study area.

17.9.211 Operational employment opportunities would provide long-term employment where the workforce is likely to reside in the wider study area. As a result, the overall magnitude of impact on health and wellbeing from employment opportunities would be medium. In the context of a high sensitivity receptor, the significance of the resultant effect is considered **moderate beneficial** which is significant in terms of the EIA Regulations.

Health and Wellbeing Effects from Changes in Exposure to Light

17.9.212 There would be permanent lighting associated with completion of the operation-phase of the Project. As stated in Chapter 8: Landscape, Townscape and Visual Resources, lighting would be prominent at the following locations/for the following receptors as vegetation designed to screen visual effects is not fully matured:

- River Mole public right of way;
- National Cycle Route 21 and open space through Riverside Garden Park;
- Meadowcroft House;
- railway passengers; and
- Horley residential edge.

17.9.213 Transient receptors travelling along the River Mole public right of way, through Riverside Garden Park, the road/railway network and occupiers of an office building (Meadowcroft House) are not considered to be sensitive in a health and wellbeing context as there is no potential for consistent sleep disturbance (which would be the case at residential receptors).

17.9.214 At approximately 95 residences in Horley's residential edge, lighting columns, lit signs and vehicle lights would be visible filtered through vegetation against a backdrop of skyglow from the airport. It is unlikely that residents would experience a perceptible change in summer due to the screening effects of intervening vegetation when in leaf; by the summer of 2048, there is unlikely to be any discernible change in view at receptors due to mitigation planting growth. However, in winter, Chapter 8: Landscape, Townscape and Visual Resources reports a minor adverse effect during the day and at night, which would not be significant.

17.9.215 As a result, the magnitude of impact on health and wellbeing from changes in light exposure would be low. In the context of a high sensitivity receptor, the significance of the resultant effect is considered **minor adverse** which is not significant in terms of the EIA Regulations.

Health and Wellbeing Effects from Changes to Water Quality, Flood Risk and Ground Conditions

Water Quality and Flood Risk

17.9.216 During the design year (2038), the Project has the potential to impact surface water both adversely and beneficially. As determined by Chapter 11: Water Environment, in most cases (adversely or beneficially), the significance of effect is established to be minor (not significant).

17.9.217 The Project also has the potential to adversely impact groundwater quality. However, the significance of effect, as determined by Chapter 11: Water Environment, is anticipated to be negligible/minor (not significant) in all circumstances.

17.9.218 In terms of flood risk, there is potential for both adverse and beneficial impacts on offsite residential receptors. As determined by Chapter 11: Water Environment, changes in surface water runoff from the introduction of additional impermeable areas and changes in drainage strategy are likely to have a minor adverse effect (not significant), while improvements to fluvial flood risk from mitigation are likely to have a moderate/major beneficial effect (significant).

17.9.219 Overall, following the implementation of additional mitigation (as detailed in Chapter 11: Water Environment), the magnitude of impact on health and wellbeing is considered to be negligible. In

the context of a high sensitivity receptor, the significance of the resultant effect is considered to be **minor beneficial** which is not significant in terms of the EIA Regulations.

Ground Conditions

17.9.220 As stated in Chapter 10: Ground Conditions, any remediation activities would be completed by 2038.

17.9.221 As a result, the magnitude of impact on health and wellbeing is considered to be negligible. In the context of a high sensitivity receptor, the significance of the resultant effect is considered to be **minor adverse** which is not significant in terms of the EIA Regulations.

Health and Wellbeing Effects from Changes to Local Healthcare Capacity

Port Health

17.9.222 As previously stated, baseline Port Health statistics are outlined in Section 17.6 and show that while the increase in calls to Gatwick Control Centre between 2015 and 2018 correlates with an increase in passenger throughput per annum, the number of passengers who have been taken to hospital has shown a general decrease and the number of passengers who have continued their journey has increased.

17.9.223 As such, it is clear that the residual impact on external healthcare providers is not solely a function of passenger throughput, as the intervention, triage and care provided can significantly reduce the need for ambulance call outs. It is proposed that at ES stage, a forecast of Port Health statistics based on passenger throughput in the design year (2038) will be explored.

Occupational Health

17.9.224 While occupational healthcare for the operational workforce is covered under the Health and Safety at Work Act 1974, existing and future occupational health provision will be explored at the ES stage.

Conclusion

17.9.225 As a result, the overall magnitude of impact on health and wellbeing from changes to local healthcare capacity would be negligible. In the context of a uniformly high sensitivity receptor, the significance of the resultant effect is considered to be **minor adverse**, which is not significant in terms of the EIA Regulations.

Further Mitigation

17.9.226 Mitigation measures proposed during 2038 focus on limiting environmental precursors to potential health and wellbeing outcomes to a level which is not considered significant. As a result, the measures proposed as part of the Project would preclude any significant adverse health and wellbeing effects. No further mitigation or enhancement measures are recommended at this stage.

Future Monitoring

17.9.227 Generally, recommended monitoring focuses on environmental precursors to potential health and wellbeing outcomes. As a result, any recommended monitoring measures relating to health and wellbeing are described within the relevant topic chapters. However, it is anticipated that public

health event data and emergency call out rates from Port Health will be made available to the community liaison group to further communicate the measures in place to protect public health and minimise impacts on local health care providers.

Significance of Effects

17.9.228 No further mitigation or monitoring is required; therefore, the significance of effects would remain as presented above.

2047

17.9.229 All health and wellbeing determinants addressed within this chapter (other than changes in transport nature and flow rate, and associated traffic noise impacts) have assessed the following main assessment years, capturing the worst-case health and wellbeing effects:

- initial construction phase (2024-2029);
- first full year of opening (2029);
- interim assessment year (2032); and
- design year (2038).

17.9.230 As shown in Table 17.9.13, changes in risk factors associated with air noise in 2047 (ie hypertension, annoyance and sleep disturbance) do not materially change the population health outcomes assessed when compared to the main assessment years. Similarly, levels of ground noise and therefore, the health and wellbeing effects of ground noise with the Project in 2047, would be lower than those in 2038.

Table 17.9.13: Noise Exposure Health Parameters (2047 with Project when compared to the 2047 baseline) – Population Attributable Fraction (PAF)

Health Parameter	Estimated number of cases (PAF – 2047 Baseline scenario)	Estimated number of cases (PAF – 2047 with Project scenario)	Total change (PAF – estimated number of cases)
Risk factors			
Hypertension prevalence (a)	45	57	+12
Hypertension prevalence (b)	80	102	+22
Highly annoyed	1,274	1,626	+352
Highly sleep disturbed	1,100	1,277	+176
Health outcomes			
Stroke incidence and mortality	<1	<1	0
CHD incidence	<1	<1	0
IHD incidence and mortality	<1	<1	0
Dementia incidence	<1	<1	0
Depression and anxiety prevalence	55	70	+15

17.9.231 Regarding potential health and wellbeing effects from changes in lifestyle factors (ie access to open space for physical activity and recreational opportunities), the main assessment years show no effects following the first full year of opening (2029). This is on the basis that any temporary or permanent impacts on public open space would be in effect and mitigation measures applied would be established. On this basis, there would be no effects in 2047.

17.9.232 Similarly, remediation activities are only associated with the construction phase. On the basis that the Project would be fully operational, there would be no effects in 2047.

17.9.233 As previously stated in relation to permanent lighting associated with completion of the operational phase of the Project, it is unlikely that residents would experience a perceptible change in summer due to the screening effects of intervening vegetation when in leaf. By the summer of 2047 specifically, there is unlikely to be any discernible change in view at receptors due to mitigation planting growth.

17.9.234 The additional impermeable area created and below ground structures required (eg foundations) as part of the Project would not change between the design year 2038 and 2047. Furthermore, by 2038 any mitigation measures applied would be established. On this basis, the potential effects associated changes in water quality and flood risk have been accounted for in the main assessment scenarios.

17.9.235 The direct, indirect and induced employment and associated health and wellbeing benefits generated are directly correlated with passenger throughput. On the basis that passenger throughput would not materially increase beyond the design year (2038), the effects in 2047 would not exceed those described in the main assessment years.

17.9.236 Similarly, while the throughput of passengers associated with the Project is associated with an increase in calls to Gatwick Control Centre, the number of passengers who have been taken to hospital has shown a general decrease. On this basis, the potential impact on healthcare capacity in 2047 is not anticipated to exceed those described in the main assessment years.

Risk Perception

Health Effects from Electro-Magnetic Fields (EMF)

17.9.237 The Project includes the reorientation and distribution of the airport substation and grid infrastructure, with the potential to modify EMF. However, as stated in the Department for Energy and Climate Change (DECC) Voluntary Code of Practice (DECC, 2012), compliance with the ICNIRP public exposure guidelines set to protect health is assumed for electricity distribution infrastructure, overhead power lines or underground cables operating at ≤132 kV, without the need for more detailed assessment. This is on the basis of evidence published by the Energy Networks Association (ENA) showing that by design such infrastructure is not capable of causing exceedance of the public exposure guideline limits.

17.9.238 As outlined by the ENA (National Grid, n.d.), based on a worst-case hypothetical design (ie L7 pylon design with 7 m clearance, 1.4 kA per circuit and untransposed phasing), the pylon would produce 3.6 kV/m electric field and 46 µT magnetic field. Therefore, this worst-case pylon design, and all practical pylons at 132 kV and below, are compliant by design. On this basis, the 33 kV required by the Project would remain below the ICNIRP exposure guidelines set to be protective of human health.

17.9.239 Any electricity supply infrastructure included as part of the Project would operate at ≤132 kV and would therefore comply with the guideline exposure limit set to protect public health.

Extended Operational Hazards

17.9.240 Extended operational hazards include the risk from major accidents, fuel storage, changes to Public Safety Zones[10], and the transmission of communicable diseases.

17.9.241 The risks associated with fuel storage are covered throughout Appendix 5.3.3: Major Accidents and Disasters whereby the sources and hazards are clearly identified, and emergency responses outlined. Effects in relation to Public Safety Zones will be considered once the outcome of the Civil Aviation Authority's consultation on standardising Public Safety Zones is known.

17.9.242 The potential risk from communicable disease transmission is currently managed by implementation of the International Health Regulations which place a legally-binding requirement for 196 countries, including all Member States of the World Health Organization (WHO), to prevent and respond to acute public health risks that have the potential to cross trans-national boundaries and threaten people worldwide. Measures include:

- surveillance to establish any potential transboundary risk;
- informing national travel recommendations, airlines and ports of any heightened risk and acute symptoms to screen for;
- refusal for travel by airlines should symptoms be prevalent at the country of origin;
- visual screening for acute symptoms taking place during boarding and on-board flights; and
- cataloguing of any health condition mid-flight other than air sickness by airline staff, which is signed off by the pilot-in-command and relayed to the destination for instruction (eg diversion, priority landing, quarantine and/or medical assistance upon arrival).

17.9.243 Public Health England (PHE) is the National Focal Point for the International Health Regulations, monitoring international communicable health risks to the UK, and providing regular epidemiological updates, assessing potential risk, offering travel advice and briefing health services on the symptoms, health conditions and clinical interventions to be aware of. PHE also has various specialist advice and diagnostic units (eg the Imported Fever Service or Rare and Imported Pathogens Laboratory) to assist doctors with managing cases where travellers have returned to the UK with infectious diseases.

17.9.244 Overall, the Project has no influence on the approach to dealing with international communicable disease transmission and does not alter the hazard profile, international regulatory requirement, PHE duty, or measures in place to monitor, prevent, contain and respond to the transmission of international communicable disease.

Health Effects from Pests

17.9.245 Infrastructure projects can alter habitats and food chains that might attract opportunistic species that are typically regarded as pests. Without management, airports could provide good year-round habitats for insects, rodents, rabbits, deer, foxes and birds that could theoretically present an aircraft maintenance hazard and can pose a direct collision hazard to aircraft moving on the

[10] Public Safety Zones are defined as "areas of land at the ends of the runways at the busiest airports, within which development is restricted in order to control the number of people on the ground at risk of death or injury in the event of an aircraft accident on take-off or landing"

ground and in flight. Such species can further attract raptors presenting an associated strike hazard.

17.9.246 However, the potential hazard is well known, understood and already addressed at Gatwick Airport through existing design and management measures. Further to this, the CoCP will ensure the risk of pest/vermin infestation would be reduced by ensuring any putrescible waste (eg food waste) is stored appropriately and regularly collected, and effective preventative pest control measures are implemented.

17.10. Potential Changes to the Assessment as a Result of Climate Change

17.10.1 The primary impacts associated with climate change include increased temperatures, increased atmospheric CO_2 and increased incidence of extreme weather events. These primary impacts affect several environmental functions (such as water availability, salinization, varying crop yields, wildfires, ozone/PM concentrations, and migration patterns) which could plausibly alter the prevalence of a range of health and wellbeing outcomes.

17.10.2 Of particular relevance in this context is the modification of atmospheric emission dispersion, related concentration hazard exposure and consequent changes in cardiovascular/respiratory disease prevalence associated with climate change driven meteorological variations.

17.10.3 However, at this stage it is not possible to predict future changes in climate change driven meteorological variations which have the potential to influence health and wellbeing. While the effects of climate change outlined above have the potential to exacerbate existing health and wellbeing outcomes at a population level, there are clear limitations associated with predicting future meteorological variations that influence health and wellbeing. Despite this, the effects of climate change likely to be realised during the operational lifetime of the Project are not expected to materially alter the conclusions of this assessment.

17.11. Cumulative Effects

Zone of Influence

17.11.1 The zone of influence (ZoI) for health and wellbeing has been identified based on the spatial extent of likely effects. Following the same approach applied in the main assessment, the ZoI for health and wellbeing remains consistent with the inter-related technical disciplines that the health and wellbeing topic relies upon.

Screening of Other Developments and Plans

17.11.2 The Cumulative Effect Assessment (CEA) takes into account the impact associated with the Project together with other developments and plans. The projects and plans selected as relevant to the CEA presented within this chapter are based upon the results of a screening exercise undertaken as part of the 'CEA short list' of developments (see Appendix 19.4.1). Each development on the CEA long list has been considered on a case by case basis for scoping in or out of this chapter's assessment based upon data confidence, effect-receptor pathways and the spatial/temporal scales involved.

17.11.3 In undertaking the CEA for the Project, it is important to bear in mind that the likelihood of other developments and plans being constructed varies depending on how far along the planning

process they are. For example, relevant developments and plans that are already under construction are likely to contribute to a cumulative impact with the Project (providing impact or spatial pathways exist), whereas developments and plans not yet approved or not yet submitted are less certain to contribute to such an impact, as some may not achieve approval or may not ultimately be built due to other factors. For this reason, all relevant development and plans considered cumulatively alongside the Project have been allocated into 'Tiers', reflecting their current stage within the planning and development process. Appropriate weight is therefore given to each Tier in the decision-making process when considering the potential cumulative impact associated with the Project (eg it may be considered that greater weight can be placed on the Tier 1 assessment relative to Tier 2). Further details of the screening process for the inclusion of other developments and plans in the short list and a description of the Tiers is provided in Chapter 19: Cumulative Effects and Inter-relationships.

17.11.4 The specific developments scoped into the CEA for health and wellbeing remain consistent with the inter-related technical disciplines that the health and wellbeing chapter draws from and builds upon. Full details of each of the developments is provided in Appendix 19.4.1.

Cumulative Effects Assessment

Cumulative Health and Wellbeing Effects from Changes to Air Quality

17.11.5 As stated in Chapter 13: Air Quality, the traffic data used to inform air quality modelling and the assessment for all scenarios include traffic forecasts generated for all known future developments. As a result, the air quality assessment and consequent health and wellbeing assessment incorporates cumulative impacts. As such, no further cumulative assessment is necessary.

Cumulative Health and Wellbeing Effects from Changes in Noise Exposure

17.11.6 Chapter 14: Noise and Vibration considers combined effects (ie noise generated from multiple sources all of which are associated with the Project) and cumulative effects (noise generated from multiple sources associated with other developments).

17.11.7 Regarding combined effects, there is the potential for different sources of noise to combine, which will vary by scenario dependent on which sources of noise are relevant to that scenario. For example, construction, air, ground and road traffic noise sources are only relevant for the first full year of opening (2029) and the interim assessment year (2032) where construction activities are ongoing while operational activities increase.

17.11.8 During these early years of operation, combined noise effects are likely to be minor on the basis that changes in air, ground and road traffic noise in the early years of operation are small compared to the likely levels of construction noise that are required to generate significant short-term effects at particular receptors. Therefore, no further cumulative health and wellbeing effects are anticipated.

17.11.9 During operation (after construction activities cease), there is potential for air, ground and traffic noise impacts to combine. However, combined traffic noise effects are expected to be minor, on the basis that road traffic noise increases near the highway improvements would be mitigated by design and traffic noise increases elsewhere and are expected to be small.

17.11.10 In addition, there is the potential for operational ground and air noise impacts to combine at receptors in the vicinity of the airport. However, these properties would be included within the noise insulation scheme which is designed to mitigate significant effects associated with noise. Therefore, no further cumulative health and wellbeing effects are anticipated.

17.11.11 Other than the Heathrow Third Runway project, the relevant cumulative developments identified in Table 14.11.1 of Chapter 14: Noise and Vibration are all residential whereby, rather than contribute to noise levels, there would be an increase in the number of people exposed to changes in noise associated with the Project. If all cumulative developments were to be built, there would be up to an additional 15,268 dwellings. However, the majority of the residential development sites are to the south of the airport and in most cases fall within the lower air noise contour bands or in areas where air noise levels will reduce. On this basis, despite an increase in the number of people in the vicinity of the Project, cumulatively, the increase in exposure is not expected to quantify a measurable change in health and wellbeing effects.

17.11.12 The Heathrow Third Runway project would increase aircraft noise over a wide area including in the area between the two airports. At PEIR stage, the design of the airspace required to facilitate a third runway at Heathrow is not sufficiently developed to allow for a cumulative noise assessment and as such, no health and wellbeing assessment is possible. As GAL progresses its work and prepares its final documents, including the Environmental Statement, which will accompany the application for development consent, the status and information available regarding the Heathrow Third Runway project will be reviewed, and the ES noise assessment will consider the implications, where feasible and appropriate.

Cumulative Health and Wellbeing Effects from Changes in Transport Nature and Flow Rate

17.11.13 As stated in Chapter 12: Traffic and Transport, the cumulative traffic and transport effects are included in the future baseline scenarios. As a result, the traffic assessment and consequent health and wellbeing assessment incorporates cumulative effects. As such, no further cumulative assessment is necessary.

17.11.14 For the ES, the traffic model will be updated to capture any change to the list of cumulative developments. The health and wellbeing assessment will also be updated to remain consistent with key traffic model outputs and conclusions relating to severance, pedestrian and cyclist amenity, and accidents and safety.

Cumulative Health and Wellbeing Effects from Changes in Lifestyle Factors

17.11.15 As stated in Chapter 18: Agricultural Land Use and Recreation, the proposed development of the Horley Business Park is set out in Policy HOR9 ‘Horley Strategic Business Park’ of the adopted Reigate and Banstead Development Management Plan 2018-2027. If the proposed development proceeds, it would be subject to a number of requirements and considerations including:

- the retention or re-routing of public footpath 362a (Sussex Border Path) across the site to maintain a pedestrian link from Balcombe Road to the footbridge across the railway;
- upgrading and extension of pedestrian/cycle routes from the Business Park to Horley town centre and Gatwick Airport station; and
- provision and delivery of the public open space area.

17.11.16 These requirements and considerations are noted in Chapter 18: Agricultural Land Use and Recreation and are not anticipated to have any significant cumulative impacts on the Sussex

Border Path. As such, the resultant effect on health and wellbeing is also not anticipated to be significant.

Cumulative Health and Wellbeing Effects from Changes in Socio-economic Factors

17.11.17 As stated in Chapter 16: Socio-economic Effects, the construction or operation of any identified cumulative development (including Heathrow Third Runway) is not anticipated to change the construction and operational effects conclusions for the Project. As a result, there would be no likely cumulative effects on health and wellbeing.

17.11.18 Regarding the Heathrow Third Runway project specifically, the impact zone defined for potential effects shows that there is only overlap in one local authority area (Elmbridge Borough in Surrey). However, analysis shows that there would remain a surplus of labour supply in the area to meet demand for both the Project and Heathrow Third Runway.

Cumulative Health and Wellbeing Effects from Changes in Exposure to Light

17.11.19 No cumulative effects relating to exposure to light have been identified by Chapter 8: Landscape, Townscape and Visual Resources for any assessment scenario. As a result, there would be no likely cumulative effects on health and wellbeing.

Cumulative Health and Wellbeing Effects from Changes to Water Quality, Flood Risk and Ground Conditions

17.11.20 As stated in Chapter 10: Ground Conditions and Chapter 11: Water Environment, it is assumed that any approved developments would include embedded mitigation, further mitigation (if required) and remediation (where appropriate) to ensure there is no harmful impact from exposure to ground conditions or upon water quality and flood risk. As such, the resultant effect on health and wellbeing is not anticipated to be significant.

Cumulative Health and Wellbeing Effects from Changes in Local Healthcare Capacity

17.11.21 It is recognised that the demand on the local labour market due to construction of the Project may deplete the amount of local resources available for construction of all approved developments and therefore increase the requirement for commuting workers to meet this demand.

17.11.22 However, the occupational health needs of the partially commuting workforce will be explored as part of the ES, and mitigation provided where appropriate. Ultimately, mitigation provided would serve both the local and commuting construction workforce, having a potentially beneficial impact on local healthcare capacity. On this basis, the net effect is not anticipated to be significant.

17.12. Inter-Related Effects

17.12.1 The purpose of the health and wellbeing chapter is to draw from and build upon technical outputs presented for a range of environmental and socio-economic health determinants. As such, there are several inter-relationships between health and wellbeing and other topics, namely: Chapter 8: Landscape, Townscape and Visual Resources; Chapter 10: Ground Conditions; Chapter 11: Water Environment; Chapter 12: Traffic and Transport; Chapter 13: Air Quality; Chapter 14: Noise and Vibration; Chapter 16: Socio-economic Effects; and Chapter 18: Agricultural Land Use and Recreation. A summary of these inter-relationships is provided below.

- Health and traffic/transport – a change in transport nature (ie increasing presence of HGVs) can cause negative mental and social health and wellbeing impacts through reducing pedestrian amenity (and potentially causing intimidation effects). In addition, an increase in overall traffic flow rate can increase risk of accident and injury.
- Health and air quality – there is a linear relationship between exposure to air pollutants and attributed health outcomes, such as hospital admission/mortality rate from respiratory and cardiovascular diseases.
- Health and noise or vibration – there is a complex relationship between noise/vibration and attributed health outcomes, such as hospital admission/mortality rate from cardiovascular disease and mental health conditions (eg depression, anxiety and dementia). Noise/vibration can affect health both directly (in extreme circumstances – less common), and indirectly (through annoyance or sleep disturbance). However, the health effects from noise/vibration can also be affected by tonality and type of noise (eg low frequency noise, infrasound and amplitude modulation).
- Health and light – exposure to light at night can increase risk of sleep disturbance, with consequent health and wellbeing effects.
- Health and water quality – water contaminated by heavy metals and/or toxins can cause a range of health and wellbeing effects depending on the type of pollutant and mode of exposure. In addition, waterborne diseases (eg cholera) are spread through contaminated water.
- Health and floods – floods can have direct impacts on health, which range from fatalities to diseases associated with exposure to contaminated water. In addition, floods can have significant social impacts associated with displacement of communities.
- Health and land contamination – land contaminated by heavy metals and/or toxins can cause a range of health and wellbeing effects depending on the type of pollutant and mode of exposure.
- Health and access to open space – open space provides the opportunity for physical activity and recreation, which have health and wellbeing benefits.
- Health and employment – good quality, stable employment is one of the most important determinants of good health and wellbeing. Employment provides a stable income, that can be used to influence a range of lifestyle factors, which can influence health.
- Health and education/training – education and training paves the way to gaining good quality, stable employment.

17.12.2 As these health determinants described within the relevant technical disciplines have informed the health and wellbeing assessment, it can be concluded that all relevant inter-relationships have been fully considered within the health and wellbeing chapter.

17.13. Summary

17.13.1 Overall, no significant health and wellbeing effects (adverse or beneficial) have been identified during the initial construction phase for the range of determinants assessed. Potential health and wellbeing effects from changes in environmental health determinants assessed (ie air quality and transport nature/flow rate) are considered to be of minor adverse significance on the basis that impacts would generally be temporary, intermittent and managed through the implementation of best practice construction methods. In addition, health and wellbeing effects from changes in exposure to temporary lighting have been explored, but predicted to have no change, on the basis that no residential receptors would be impacted.

17.13.2 In terms of wider determinants, beneficial health and wellbeing effects have been predicted for changes in lifestyle factors and socio-economic factors during the initial construction phase (ie employment) due to job creation. In addition, impacts on healthcare capacity due to the influx of a non-home-based workforce is intended to be managed internally to ensure that any effect is not significant.

17.13.3 The first full year of opening (2029) and the interim assessment year (2032) would include a combination of construction and operation-related health and wellbeing effects. However, health and wellbeing effects associated with environmental determinants (ie air quality, noise and transport) would remain not significant. Similarly, there would be no significant change in exposure to temporary or permanent lighting for residential receptors. The significance of health and wellbeing effects from changes in lifestyle factors would remain minor beneficial and not significant in EIA terms in both assessment scenarios.

17.13.4 The significance of health and wellbeing effects from changes in socio-economic factors (ie employment) would increase from minor beneficial in the first full year of opening (2029) to moderate beneficial in the interim assessment year (2032), which is considered significant in EIA terms. This is primarily due to the magnitude of indirect and induced job opportunities expected to be provided.

17.13.5 In terms of health and wellbeing effects from changes in healthcare capacity, a number of elements have been assessed (relating to construction and operation), which comprise the increase in demand for local health care services due to the influx of a non-home-based construction workforce, or from emergency call outs associated with increased passenger throughput. Overall, the effect on health and wellbeing is not considered significant, on the basis that any potential increase in demand is intended to be managed internally.

17.13.6 Finally, the design year (2038) is an operation only scenario. Health and wellbeing effects associated with environmental determinants would remain not significant. Operational employment opportunities (direct, indirect and induced) would reach their peak and continue to have moderate beneficial health and wellbeing effects, which are considered to be significant in EIA terms. There would no longer be a construction workforce, so any changes to healthcare capacity would be limited to emergency call outs associated with increased passenger throughput, which would not be significant on the basis that any change is intended to be managed internally.

Next Steps

17.13.7 At this stage, it is anticipated that the next steps in producing the final health and wellbeing ES chapter will include:

- further testing the conclusions of the health and wellbeing assessment relating to changes in air quality by applying quantitative assessment methods using relevant risk ratios;
- further assessment relating to the health and wellbeing effects of construction noise and ground noise, drawing from the outputs of noise modelling;
- explore existing and future occupational healthcare provision at the airport;
- quantitatively forecast changes to Port Health response at the airport using existing statistics on passenger throughput and response rate; and
- further development of the cumulative effects assessment for the full range of health and wellbeing determinants.

Table 17.13.1: Summary of Effects

Receptor	Receptor Sensitivity	Description of Impact	Short/ medium/ long term/ permanent	Magnitude of Impact	Significance of Effect	Significant/ not significant	Notes
Initial Construction Phase: 2024-2029							
Health and wellbeing effects from changes in air quality	High	Increase in exposure to construction dust and transport related air pollutants (NO_2 and PM)	Medium term, temporary	Negligible	Minor adverse	Not significant	
Health and wellbeing effects from changes in noise exposure	High	Increase in noise exposure associated with on-site construction activities	Medium term, temporary	To be assessed at ES stage	To be assessed at ES stage	To be assessed at ES stage	
		Increase in exposure to noise associated with construction and operational traffic	Medium term, temporary	To be assessed at ES stage	To be assessed at ES stage	To be assessed at ES stage	
Health and wellbeing effects from changes in transport nature and flow rate	High	Changes to severance	Medium term, temporary	Negligible	Minor adverse	Not significant	
		Changes to pedestrian and cyclist amenity		Low			
		Changes to accidents and safety		Negligible			
Health and wellbeing effects from changes in lifestyle factors	High	Changes to access to green space, recreation and physical activity	Medium term, temporary	Low	Minor beneficial	Not significant	
Health and wellbeing effects from changes in socio-economic factors	High	Increase in direct, indirect and induced employment opportunities	Medium term, temporary	Low	Minor beneficial	Not significant	

Receptor	Receptor Sensitivity	Description of Impact	Short/ medium/ long term/ permanent	Magnitude of Impact	Significance of Effect	Significant/ not significant	Notes
Health and wellbeing effects from changes in exposure to light	High	Increase in exposure to light required for night time construction work	Medium term, temporary	Negligible	Minor adverse	Not significant	
Health and wellbeing effects from changes to water quality and flood risk	High	Potential depletion of surface water and ground water quality; and increased flood risk from construction activities	Medium term, temporary	Negligible	Minor adverse	Not significant	
Health and wellbeing effects from ground conditions	High	Potential exposure to contaminants from construction activities, which include breaking the ground surface and disturbing soil	Medium term, temporary	Negligible	Minor adverse	Not significant	
Health and wellbeing effects from changes in healthcare capacity	High	Increase in demand for local health care services due to the influx of a non-home-based construction workforce	Medium term, temporary	To be assessed at ES stage	To be assessed at ES stage	To be assessed at ES stage	
First full year of opening: 2029							
Health and wellbeing effects from changes in air quality	High	Increase in exposure to transport related air pollutants (NO_2 and PM)	Medium term, temporary (cons.)/long term, permanent (op.)	Negligible	Minor adverse	Not significant	
Health and wellbeing effects from changes in	High	Increase in noise exposure associated with on-site	Medium term, temporary (cons.)	To be assessed at ES stage	To be assessed at ES stage	To be assessed at ES stage	

Receptor	Receptor Sensitivity	Description of Impact	Short/ medium/ long term/ permanent	Magnitude of Impact	Significance of Effect	Significant/ not significant	Notes
construction noise exposure		construction activities and associated transport movements					
Health and wellbeing effects from changes in noise exposure	High	Increase in exposure to air noise associated with additional flights	Long term, permanent	Negligible	Minor beneficial (during the day) and minor adverse (during the night)	Not significant	
		Increase in exposure to ground noise associated with on-site activities	Long term, permanent	To be assessed at ES stage	To be assessed at ES stage	To be assessed at ES stage	
		Increase in exposure to noise associated with construction and operational traffic	Medium term, temporary (cons.)/long term, permanent (op.)	To be assessed at ES stage	To be assessed at ES stage	To be assessed at ES stage	
Health and wellbeing effects from changes in transport nature and flow rate	High	Changes to severance	Medium term, temporary (cons.)/long term, permanent (op.)	Low	Minor adverse	Not significant	
		Changes to pedestrian and cyclist amenity		Negligible	Minor adverse	Not significant	
		Changes to accidents and safety		Negligible	Minor adverse	Not significant	
Health and wellbeing effects from changes in lifestyle factors	High	Changes to access to green space, recreation and physical activity	Medium term, temporary	Low	Minor adverse	Not significant	

Receptor	Receptor Sensitivity	Description of Impact	Short/ medium/ long term/ permanent	Magnitude of Impact	Significance of Effect	Significant/ not significant	Notes
Health and wellbeing effects from changes in socio-economic factors	High	Increase in direct, indirect and induced employment opportunities	Medium term (cons.)/long term, permanent (op.)	Low	Minor beneficial	Not significant	
Health and wellbeing effects from changes in exposure to light	High	Increase in exposure to light required for night time construction work	Medium term, temporary	Negligible	Minor adverse	Not significant	
Health and wellbeing effects from changes to water quality and flood risk	High	Potential depletion of surface water and ground water quality; and increased flood risk from construction activities	Medium term, temporary	Negligible	Minor adverse	Not significant	
Health and wellbeing effects from ground conditions	High	Potential exposure to contaminants from construction activities, which include breaking the ground surface and disturbing soil	Medium term, temporary	Negligible	Minor adverse	Not significant	
Health and wellbeing effects from changes in healthcare capacity	High	Increase in demand for local health care services due to the influx of a non-home-based construction workforce and/or emergency call outs due to increased passenger throughput; and provision of occupational healthcare	Medium term, temporary (cons.)/long term, permanent (op.)	Negligible	Minor adverse	Not significant	

Receptor	Receptor Sensitivity	Description of Impact	Short/ medium/ long term/ permanent	Magnitude of Impact	Significance of Effect	Significant/ not significant	Notes
Interim assessment year: 2032							
Health and wellbeing effects from changes in air quality	High	Increase in exposure to transport related air pollutants (NO_2 and PM)	Medium term, temporary (cons.)/long term, permanent (op.)	Negligible	Minor adverse	Not significant	
Health and wellbeing effects from changes in noise exposure	High	Increase in exposure to air noise associated with additional flights	Long term, permanent	Low	Minor adverse	Not significant	
		Increase in exposure to ground noise associated with on-site activities	Long term, permanent	Low	Minor adverse	Not significant	
		Increase in exposure to noise associated with operational traffic	Long term, permanent	Low	Minor adverse	Not significant	
Health and wellbeing effects from changes in transport nature and flow rate	High	Changes to severance	Medium term, temporary (cons.)/long term, permanent (op.)	Low	Minor adverse	Not significant	
		Changes to pedestrian and cyclist amenity		Low	Minor adverse	Not significant	
		Changes to accidents and safety		Negligible	Minor adverse	Not significant	
Health and wellbeing effects from changes in socio-economic factors	High	Increase in direct, indirect and induced employment opportunities	Medium term, temporary (cons.)/long term, permanent (op.)	Medium	Moderate beneficial	Significant	
Health and wellbeing effects from changes in exposure to light	High	Increase in exposure to light required for night time construction work	Medium term, temporary	Negligible	Minor adverse	Not significant	

Receptor	Receptor Sensitivity	Description of Impact	Short/ medium/ long term/ permanent	Magnitude of Impact	Significance of Effect	Significant/ not significant	Notes
Health and wellbeing effects from changes to water quality and flood risk	High	Potential depletion of surface water and ground water quality; and increased flood risk from construction activities	Medium term, temporary	Negligible	Minor adverse	Not significant	
Health and wellbeing effects from ground conditions	High	Potential exposure to contaminants from construction activities, which include breaking the ground surface and disturbing soil	Medium term, temporary	Negligible	Minor adverse	Not significant	
Health and wellbeing effects from changes in healthcare capacity	High	Increase in demand for local health care services due to the influx of a non-home-based construction workforce and/or emergency call outs due to increased passenger throughput; and provision of occupational healthcare	Medium term, temporary (cons.)/long term, permanent (op.)	Negligible	Minor adverse	Not significant	
Design year: 2038							
Health and wellbeing effects from changes in air quality	High	Increase in exposure to transport related air pollutants (NO_2 and PM)	Long term, permanent	To be assessed at ES stage	To be assessed at ES stage	To be assessed at ES stage	
	High	Increase in exposure to air noise associated with additional flights	Long term, permanent	Low	Minor adverse	Not significant	

Receptor	Receptor Sensitivity	Description of Impact	Short/ medium/ long term/ permanent	Magnitude of Impact	Significance of Effect	Significant/ not significant	Notes
Health and wellbeing effects from changes in noise exposure		Increase in exposure to ground noise associated with on-site activities		Low	Minor adverse	Not significant	
		Increase in exposure to noise associated with operational traffic		Negligible	Minor adverse	Not significant	
Health and wellbeing effects from changes in transport nature and flow rate	High	Changes to severance	Long term, permanent	Negligible	Minor adverse	Not significant	
		Changes to pedestrian and cyclist amenity		Negligible	Minor adverse	Not significant	
		Changes to accidents and safety		Negligible	Minor adverse/ beneficial	Not significant	
Health and wellbeing effects from changes in socio-economic factors	High	Increase in direct, indirect and induced employment opportunities	Long term, permanent	Medium	Moderate beneficial	Significant	
Health and wellbeing effects from changes in exposure to light	High	Increase in exposure to light required for night time construction work	Medium term, temporary	Low	Minor adverse	Not significant	
Health and wellbeing effects from changes to water quality and flood risk	High	Potential depletion of surface water associated with flood risk mitigation; potential depletion of ground water quality; and reduced flood risk	Long term, permanent	Negligible	Minor beneficial	Not significant	
Health and wellbeing effects from ground conditions	High	Potential exposure to contaminants during operation following completion of remediation works	Long term, permanent	Negligible	Minor adverse	Not significant	

Receptor	Receptor Sensitivity	Description of Impact	Short/ medium/ long term/ permanent	Magnitude of Impact	Significance of Effect	Significant/ not significant	Notes
Health and wellbeing effects from changes in healthcare capacity	High	Increase in demand for local health care services due to emergency call outs due to increased passenger throughput; and provision of occupational healthcare	Long term, permanent	Negligible	Minor adverse	Not significant	

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17.15. Glossary

Table 17.15.1: Glossary of Terms

Term	Description
CEA	Cumulative Effects Assessment
CITB	Construction Industry Training Board
CO_2	Carbon dioxide
CoCP	Code of Construction Practice
CTMP	Construction Traffic Management Plan
Defra	Department for Environment, Food and Rural Affairs
DMP	Dust Management Plan
DMRB	Design Manual for Roads and Bridges
EIA	Environmental Impact Assessment
EMF	Electro-magnetic fields
ES	Environmental Statement
HGV	Heavy Goods Vehicle
HIA	Health Impact Assessment
ICNIRP	International Commission on Non-Ionizing Radiation Protection

Term	Description
IHD	Ischaemic Heart Disease
JSNA	Joint Strategic Needs Assessment
LOAEL	Lowest Observed Adverse Effect Level
LSOA	Lower Super Output Area
NHS	National Health Service
NOx	Nitrogen oxides
NPPF	National Planning Policy Framework
NPPG	National Planning Practice Guidance
NPS	National Policy Statement
ONS	Office for National Statistics
OESBS	Outline Employment Skills and Business Strategy
PAF	Population Attributable Fraction
PAOC	Potential Area of Concern
PEIR	Preliminary Environmental Information Report
PHE	Public Health England
QOF	Quality Outcomes Framework
SOAEL	Significant Observed Adverse Effect Level
WHO	World Health Organization
ZoI	Zone of Influence

Preliminary Environmental Information Report
Chapter 18: Agricultural Land Use and Recreation

September 2021

Table of Contents

18 Agricultural Land Use and Recreation

18.1. Introduction

18.1.1 This chapter of the Preliminary Environmental Information Report (PEIR) presents the findings of the Environmental Impact Assessment (EIA) work undertaken to date concerning the potential effects of the proposal to make best use of Gatwick's existing runways (referred to within this report as 'the Project') on agricultural land use and recreation.

18.1.2 Specifically, this chapter considers the potential effects of the Project on agricultural land use and recreational resources, including areas of public open space, public rights of way and other linear recreational routes during its construction and operational phases.

18.1.3 Those effects of the Project that may affect the visual and acoustic amenity of recreational resources are assessed in Chapter 8: Landscape, Townscape and Visual Resources and Chapter 14: Noise and Vibration, where appropriate. Socio-economic effects are considered within Chapter 16: Socio-economics.

18.1.4 In particular, this PEIR chapter:

- sets out the existing and future environmental baseline conditions, established from desk studies, surveys and consultation to date;
- presents the potential environmental effects on agricultural land use and recreation arising from the Project, based on the information gathered and the analysis and assessments undertaken to date;
- identifies any assumptions and limitations encountered in compiling the environmental information; and
- highlights any necessary monitoring and/or mitigation measures that could prevent, minimise, reduce or offset the possible environmental effects identified during the EIA process.

18.1.5 This chapter is accompanied by Figures 18.6.1 to 18.6.5. It also summarises information contained within technical reports, which are included at Appendix 18.2.1: Summary of Local Planning Policy; Appendix 18.3.1: Summary of Stakeholder Scoping Responses; Appendix 18.6.1: Published Agricultural Land Classification Data; Appendix 18.6.2: Soil Survey Results; and Appendix 18.6.3: Recreational User Survey.

18.1.6 The PEIR will inform pre-application consultation. Following consultation, comments on the PEIR will be reviewed and taken into account, where appropriate, in preparation of the Environmental Statement (ES) that will accompany the application to the Planning Inspectorate for development consent.

18.2. Legislation and Policy

18.2.1 This section of the chapter reviews planning policy and other documentation that is relevant to the assessment of agricultural land use and recreation effects of the Project. There is no legislation relating to this topic that is relevant to this Project.

Planning Policy Context

National Policy Statements

18.2.2 The Airports National Policy Statement (NPS) (Department for Transport, 2018), although primarily provided in relation to a new runway at Heathrow Airport, remains a relevant consideration for other applications for airport infrastructure in London and the south east of England.

18.2.3 The NPS for National Networks (Department for Transport, 2015) sets out the need for development of road, rail and strategic rail freight interchange projects on the national networks and the policy against which decisions on major road and rail projects will be made[1]. This has been taken into account in relation to the highways improvements proposed as part of the Project.

18.2.4 Table 18.2.1 provides a summary of the relevant requirements of these NPSs and how these are addressed within the PEIR.

Table 18.2.1: Summary of NPS Information Relevant to this Chapter

Summary of NPS requirement	How and where considered in the PEIR
Airports NPS	
The applicant should take into account the economic and other benefits of best and most versatile agricultural land, seeking to use areas of poorer quality land in preference to those of a higher quality. The applicant should also seek to minimise impacts on soil quality (paragraph 5.115).	The mitigation/ enhancement measures adopted as part of the Project are described in Section 18.8 of this chapter and the potential impacts are considered in Section 18.9.
Existing open space, sports and recreational buildings and land should not be developed unless the land is no longer needed or the loss would be replaced by equivalent or better provision in terms of quantity and quality in a suitable location (paragraph 5.112)	
The applicant can minimise the direct effects on the existing use of the proposed site, or proposed uses near the site, by, *inter alia*, the protection of soils during construction (paragraph 5.118).	
Where green infrastructure is affected, the applicant should aim to ensure the functionality and connectivity of the green infrastructure network is maintained and any necessary works are undertaken, where possible, to mitigate any adverse impact and, where appropriate, to improve that network and other areas of open space, including appropriate access to National Trails and other public rights of way (paragraph 5.119).	
The applicant is expected to take appropriate mitigation measures to address adverse effects on National Trails, other public rights of way and open access land and, where	

[1] It is noted that the Transport Decarbonisation Plan published by Department for Transport (DfT) on 14 July 2021 announced DfT's intention to review the NPS for National Networks in due course once demand patterns post-pandemic become clearer. It is understood DfT intends to commence the review by the end of 2021 and complete it by Spring 2023. In the interim and whilst the review is undertaken, DfT has confirmed the NPS for National Networks remains relevant government policy and has full force and effect for the purposes of the Planning Act 2008.

Summary of NPS requirement	How and where considered in the PEIR
appropriate, to consider what opportunities there may be to improve access. In considering revisions to an existing right of way, consideration needs to be given to the use, character, attractiveness and convenience of the right of way (paragraph 5.123).	
NPS for National Networks	
Existing open space, sports and recreational buildings and land should not be developed unless the land is surplus to requirements or the loss would be replaced by equivalent or better provision in terms of quantity and quality in a suitable location. Applicants considering proposals which would involve developing such land should have regard to any local authority's assessment of need for such types of land and buildings (paragraph 5.166).	The mitigation/ enhancement measures adopted as part of the Project are described in Section 18.8 of this chapter and the potential impacts are considered in Section 18.9.
Applicants should take into account the economic and other benefits of the best and most versatile agricultural land (defined as land in grades 1, 2 and 3a of the Agricultural Land Classification) and seek to use areas of poorer quality land in preference to that of a higher quality. Applicants should also identify any effects, and seek to minimise impacts, on soil quality taking into account any mitigation measures proposed (paragraph 5.168).	
Where green infrastructure is affected, applicants should aim to ensure the functionality and connectivity of the green infrastructure network is maintained and any necessary works are undertaken, where possible, to mitigate any adverse impact and, where appropriate, to improve that network and other areas of open space, including appropriate access to new coastal access routes, National Trails and other public rights of way (paragraph 5.180).	
The Secretary of State should also consider whether mitigation of any adverse effects on green infrastructure or open space is adequately provided for by means of any planning obligations, for example, to provide exchange land and provide for appropriate management and maintenance agreements. Any exchange land should be at least as good in terms of size, usefulness, attractiveness, quality and accessibility. Alternatively, where Sections 131 and 132 of the Planning Act 2008 apply, any replacement land provided under those sections will need to conform to the requirements of those sections (paragraph 5.181).	
Public rights of way, National Trails, and other rights of access to land (eg open access land) are important recreational facilities for walkers, cyclists and equestrians. Applicants are expected to take appropriate mitigation measures to address adverse effects on these resources and, where appropriate, to consider what opportunities there may be to improve access. In considering revisions to an existing right of way consideration needs to be given to the use, character, attractiveness and convenience of the right of way. The Secretary of State should consider whether the mitigation measures put forward by an applicant are acceptable and whether requirements in respect of these measures might be attached to any grant of development consent	

Summary of NPS requirement	How and where considered in the PEIR
(paragraph 5.184). Public rights of way can be extinguished under Section 136 of the Act if the Secretary of State is satisfied that an alternative has been or will be provided or is not required (paragraph 5.185).	

National Planning Policy Framework

18.2.5 The National Planning Policy Framework (NPPF) (Ministry of Housing, Community and Local Government, 2021) sets out a framework for planning policies and decision making in England and is a material consideration in planning decision making. Policies relevant to this topic are as follows.

- The NPPF highlights the importance of access to high quality open spaces and opportunities for sport and physical activity to the health and well-being of communities (paragraph 98), and states that existing open space, sports and recreational buildings and land should not be built on unless certain criteria are met (paragraph 99).
- The NPPF also highlights the need for planning policies and decisions to protect and enhance public rights of way and access, including taking opportunities to provide better facilities for users, for example by adding links to existing rights of way networks including National Trails (paragraph 100).
- In relation to conserving the natural environment, the NPPF states that planning policies and decisions should contribute to and enhance it by, *inter alia*, '*recognising the intrinsic character and beauty of the countryside, and the wider benefits from natural capital and ecosystem services – including the economic and other benefits of the best and most versatile agricultural land, and of trees and woodland*' (paragraph 174 (b)). Best and most versatile agricultural land is described as '*Land in grades 1, 2 and 3a of the Agricultural Land Classification*' (Annex 2 - page 65).

18.2.6 The National Planning Practice Guidance (NPPG) supports the NPPF and provides guidance across a range of topic areas. The following parts of the NPPG are relevant to this topic.

- Guidance on the natural environment includes the need to take into account the economic and other benefits of the 'best and most versatile' agricultural land (Ministry of Housing, Communities and Local Government, 2019 paragraph 001).
- Guidance in relation to recreational resources is provided under the headings of 'Open space, sports and recreation facilities' and 'Public rights of way and National Trails', which reiterates that these form an important component of sustainable transport links and should be protected or enhanced (Ministry of Housing, Communities and Local Government, 2014 paragraphs 001 & 004).

Local Planning Policy

18.2.7 Gatwick Airport lies within the administrative area of Crawley Borough Council and adjacent to the boundaries of Mole Valley District Council to the north west, Reigate and Banstead Borough Council to the north east and Horsham District Council to the south west. The administrative area of Tandridge District Council is located approximately 1.9 km to the east of Gatwick Airport, while Mid Sussex District Council lies approximately 2 km to the south east. Gatwick Airport is located in the county of West Sussex and immediately adjacent to the bordering county of Surrey.

18.2.8 The relevant local planning policies applicable to agricultural land use and recreation based on the extent of the study area for this assessment are listed in Table 18.2.2, with further detail provided in Appendix 18.2.1.

Table 18.2.2: Local Planning Policy

Administrative Area	Plan	Policy
Adopted Policy		
Crawley	Crawley 2030: Crawley Borough Local Plan 2015-2030 (2015)	CH11 Rights of Way & Access to the Countryside
		ENV4 Open Space, Sport & Recreation
		ENV5 Provision of Open Space & Recreational Facilities
		EC9 Rural Economy
Reigate and Banstead	Reigate and Banstead Local Plan: Core Strategy (2014)	CS2 Valued Landscapes & the Natural Environment
		CS12 Infrastructure Delivery
	Reigate and Banstead Local Plan Development Management Plan 2018-2027 (2019)	OSR1 Urban Open Space
		NHE1 Landscape Protection
		NHE4 Green/ Blue Infrastructure
		TAP1 Access, Parking & Servicing
Emerging Policy		
Crawley	Draft Crawley Borough Local Plan 2021-2037 (2021)	Policy OS1: Open Space, Sport and Recreation
		Policy OS2: Provision of Open Space and Recreational Facilities
		Policy OS3: Rights of Way and Access to the Countryside
		Policy EC13: Rural Economy Policy GI1: Green Infrastructure Policy ST1: Development and Requirements for Sustainable Transport

18.3. Consultation and Engagement

18.3.1 In September 2019, Gatwick Airport Limited (GAL) submitted a Scoping Report to the Planning Inspectorate, which described the scope and methodology for the technical studies being undertaken to provide an assessment of any likely significant effects and, where necessary, to determine suitable mitigation measures for the construction and operational phases of the Project. It also described those topics or sub-topics which are proposed to be scoped out of the EIA process and provided justification as to why the Project would not have the potential to give rise to significant environmental effects in these areas.

18.3.2 Following consultation with the statutory bodies, the Planning Inspectorate (on behalf of the Secretary of State) provided a Scoping Opinion on 11 October 2019.

18.3.3 Key issues raised in this Scoping Opinion specific to agricultural land use and recreation are listed in Table 18.3.1, together with details of how these issues have been addressed within the PEIR.

Table 18.3.1: Summary of Scoping Responses

Details	How/where addressed in PEIR
Potential impacts from the Proposed Development on the nature and character of recreational resources through disturbance during construction and operation is omitted in the Scoping Report and should be assessed in the ES. (Scoping Opinion ID 4.12.1)	The assessment of potential effects on the nature and character of recreational resources within the study area is scoped into the assessment (see Table 18.4.1). The effects on the nature and character of recreational resource arising from disturbance during construction and operation as a result of the Project have been considered in Section 18.9 of this PEIR and will be carried forward to the ES.
The ES should provide the date of when the data that has been used to inform the baseline and assessment was last updated to ensure that the information being used is current. (Scoping Opinion ID 4.12.2)	Details of the surveys undertaken and the resources used to inform the baseline are presented in Section 18.4.
All information provided as a document or figure within the report or derived from other sources should be made clear through appropriate referencing in the ES. (Scoping Opinion ID 4.12.3)	Data have been provided as technical appendices where required. The source of all data is provided in the form of a reference list in Section 18.15 of this chapter.
Any agricultural land classification should be supported by guidance and accurate, current data and professional judgement in the ES to determine sensitivity of receptors and the degree to which any land temporarily or permanently affected/lost could be considered significant. (Scoping Opinion ID 4.12.4)	The approach to determining the sensitivity of receptors and effects on any temporarily or permanently affected/lost agricultural land has been based on relevant guidance; accurate, current data; and professional judgement. Details of the methodology used in this PEIR is provided in Section 18.4 and the assessment of effects in Section 18.9.
The scope of user surveys – which should include peak and shoulder periods – and the 'characteristics' of agricultural land and soil structure should be clearly defined in relation to baseline conditions and application of sensitivity of receptors. (Scoping Opinion 4.12.5)	User surveys have been completed for National Cycle Route 21 through Riverside Garden Park, which is used by both cyclists and walkers. These surveys have been undertaken at appropriate times to ensure that the peak usage is captured. The conclusions from this survey are summarised in Section 18.6 and full details included at Appendix 18.6.3 of this chapter of the PEIR. The characteristics of agricultural land and soil structure have been clearly defined in Section 18.6

Details	How/where addressed in PEIR
	of this PEIR and will form the basis of the assessment within the ES.
The Scoping Report does not explicitly define the study area. The ES should clearly define a study area based on the Zone of Influence of the Proposed Development with reference to relevant and up to date guidance. (Scoping Opinion 4.12.6)	The study area used to undertake an assessment of effects is presented in Section 18.4 of this PEIR.
Where soil excavated for the Proposed Development is to be stored and / or reused, cross reference should be made to other relevant aspect chapters and the assessment of likely significant effects. (Scoping Opinion 4.12.7)	This methodology for the stripping, storage and reinstatement of soils within the Project will be provided within the soil management strategy for the Project. See Section 18.8 of this PEIR – this will be considered further as part of the ES.
Statistics for agricultural land use in 2016 appears to have been grouped for Crawley and Mid Sussex and Reigate and Banstead and Epsom and Ewell when DEFRA provide statistics on a local authority basis. The ES should present data in a clear way to allow for accurate assessment of the likely significant effects and to avoid unintended bias in reporting. (Scoping Opinion ID 4.12.8)	The Defra statistics provide a context to the nature of agricultural land use in the vicinity of the Project as explained in Section 18.4. The detailed assessment of the effects of the Project on agricultural land use is based on the identification of the characteristics of the individual farm holdings affected as explained in Section 18.4.

18.3.4 Key issues raised during consultation and engagement with interested parties specific to agricultural land use and recreation are listed in Table 18.3.2, together with details of how these issues have been addressed within the PEIR.

Table 18.3.2: Summary of Consultation

Consultee	Date	Details	How/where addressed in PEIR
Land based working group with local planning authorities	20.08.2019 03.02.2020 29.07.2021	Discussion on the potential effects on land-based resources (including agricultural land use and recreation) arising from the Project and the proposed measures to mitigate these effects.	Mitigation measures relevant to this topic are set out in Section 18.8 and the assessment of potential effects on agricultural land use and recreational resources during the construction and operational phases of the project are set out in Section 18.9.

18.4. Assessment Methodology

Relevant Guidance

18.4.1 In addition to meeting the requirements of EIA as set out by The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (as amended), the agricultural land use and recreation assessment has taken into account the following guidance documents:

- DMRB Volume 11, LA109: Geology and Soils (Highways England *et al.,* 2019);
- Design Manual for Roads and Bridges (DMRB) Volume 11, LA 104: Environmental Assessment and Monitoring (Highways England et al., Revision 1 2020a);
- DMRB Volume 11, LA112: Population and Human Health (Highways England *et al.,* Revision 1 2020b);
- Construction Code of Practice for the Sustainable Use of Soils on Construction Sites (Department for Environment, Food and Rural Affairs (Defra), 2009); and
- Agricultural Land Classification of England and Wales: Revised Guidelines and Criteria for Grading the Quality of Agricultural Land. Ministry of Agriculture, Fisheries and Food (MAFF) (1988).

18.4.2 Although originally developed for the assessment of highways projects, the principles set out within the DMRB provide a useful basis for assessment for other major infrastructure projects.

Scope of the Assessment

18.4.3 The scope of this PEIR has been developed in consultation with relevant statutory and non-statutory consultees as detailed in Table 18.3.1 and Table 18.3.2 and comprises the assessment of potential effects on the following resources during the construction and operational stages of the Project:

- agricultural land quality and soils;
- farm holdings;
- public rights of way;
- national cycle routes;
- other walking, cycling and horse riding routes; and
- public open space.

18.4.4 Taking into account the scoping and consultation process, Table 18.4.1 summarises the issues considered as part of this assessment.

Table 18.4.1: Issues Considered within the Assessment

Activity	Potential Effects
Construction Phase	
Construction and demolition activities, including construction of upgraded highway junctions	Permanent loss of topsoil/ best and most versatile agricultural land Loss and severance of land from farm holdings (temporary/permanent). Loss/reduction of accessible public open space (temporary/permanent). Effects on the alignment of public rights of way and cycle routes (temporary).
Use of construction compounds and creation of mitigation areas	Loss of best and most versatile agricultural land, loss of topsoil, soil erosion and changes to soil structure (temporary). Loss and severance of land from farm holdings (temporary/permanent). Loss/reduction of accessible public open space (temporary). Effects on the alignment of public rights of way and cycle routes (temporary).

Activity	Potential Effects
Operational Phase	
Use of airport, including upgraded highway junctions	Permanent loss of topsoil/best and most versatile agricultural land for permanent land take Permanent loss or severance of land from farm holdings. Permanent effects to the nature and character of recreational resources.

18.4.5 Effects which are not considered likely to be significant have been scoped out of the assessment. A summary of the effects scoped out is presented in Table 18.4.2.

Table 18.4.2: Issues Scoped Out of the Assessment

Issue	Justification
Effects on common land and allotments	There are no such resources within the study area or proximate to it that are likely to be affected by the Project and therefore no impact pathway has been identified.

Study Area

18.4.6 The DMRB (LA109 and 112) (Highways Agency *et al.,* 2019, 2020b) provides broad guidance regarding a study area for the assessment of effects, referencing the extent and characteristics of a project and the communities/wards affected in LA112 and the construction footprint/project boundary (including compounds and temporary land take) in LA109.

18.4.7 The study area for effects on recreation has taken into account the need to establish local travel patterns by rights of way/recreational users and to identify resources, such as land used by the community, that have the potential to be lost. Therefore, the recreation study area includes the Project site, with account taken of any resources that lie immediately adjacent to the site or link to it, together with any areas that may be required to mitigate for any temporary or permanent effects arising from the Project.

18.4.8 The agricultural assessment has been based on the agricultural land located within the Project site along with the wider agricultural land holding associated with any land affected by the Project.

Methodology for Baseline Studies

Desk Study

18.4.9 A desk study has been undertaken in 2021 in relation to soils, agricultural land classification (ALC) and farm holdings. Information has been collated from the following information sources:

- published soil survey and British Geological Survey (BGS) information;
- Ministry of Agriculture, Fisheries and Food (MAFF) published 1 inch to 1 mile Provisional ALC Sheet;
- Defra detailed ALC and soil survey work carried out in the study area;
- site-specific climatic information taken from the agroclimatic datasets produced by the Meteorological Office for the MAFF ALC Guidelines (MAFF, 1988);

- Ordnance Survey maps at 1:25,000 scale to identify topographic characteristics of the survey area;
- Government farming statistical data produced by Defra for local authority areas to provide comparative information on agricultural land use within the study area; and
- land registry information for the land parcels within the Project site boundary.

18.4.10 A desk study to identify recreational resources within the study area was undertaken in 2019, and updated in 2021, using the following information sources:

- public rights of way from Surrey County Council's and West Sussex County Council's Interactive Definitive Maps;
- National Cycle Network routes from Sustrans at https://www.sustrans.org.uk;
- walking, horse riding and cycling routes from Reigate and Banstead Borough Council website, Crawley Borough Council website, Surrey County Council website, West Sussex Council website and Gatwick Greenspace Partnership;
- areas of public open space from Reigate and Banstead Borough Council and Crawley Borough Council websites and Horley Town Council;
- MAGIC (geographic information about the natural environment) at http://magic.defra.gov.uk; and
- Ordnance Survey maps at 1:25,000 scale.

Site-Specific Surveys

18.4.11 In addition to the desk study information on agricultural land use and soils, the assessment has been informed by site visits, information from liaison with local landowners and detailed ALC survey work in agricultural areas that would be potentially temporarily or permanently affected by the Project. This survey work was undertaken in September 2019 using a 1.2 metre Dutch hand auger to examine soil profiles at approximately 100 metre intervals across the survey areas. The results of this survey work are contained in Appendix 18.6.2.

18.4.12 A recreation survey was undertaken along National Cycle Route 21 which runs through the north-eastern area of Riverside Garden Park adjacent to the Gatwick Stream, on three occasions between May and August 2019 to ascertain the nature of the use of this area of public open space. The conclusions from this survey are summarised in Section 18.6 and full details included at Appendix 18.6.3 of this PEIR.

Assessment Criteria and Assignment of Significance

18.4.13 The significance of an effect is determined based on the sensitivity of a receptor and the magnitude of an impact. This section describes the criteria applied in this chapter to characterise the sensitivity of receptors and magnitude of potential impacts. The terms used to define magnitude and sensitivity are based on and have been adapted from those used in the DMRB methodology (Highways England *et al*., 2020a), which is described in further detail in Chapter 6: Approach to Environmental Assessment.

Receptor Sensitivity/Value

18.4.14 The criteria for defining sensitivity/value for agricultural land use and recreational receptors are outlined in Table 18.4.3 and Table 18.4.4.

Table 18.4.3: Sensitivity Criteria for Agricultural Land Use Receptors

Sensitivity	Definition Used for Agricultural Land Use Receptors
Very high	Grade 1 and 2 agricultural land. Agricultural land holdings: ▪ areas of land in which the enterprise is wholly reliant on the spatial relationship of land to key agricultural infrastructure; and ▪ access between land and key agricultural infrastructure is required on a frequent basis (daily).
High	Grade 3a agricultural land. Agricultural land holdings: ▪ areas of land in which the enterprise is dependent on the spatial relationship of land to key agricultural infrastructure; and ▪ access between land and key agricultural infrastructure is required on a frequent basis (weekly).
Medium	Grade 3b agricultural land. Agricultural land holdings: ▪ areas of land in which the enterprise is partially dependent on the spatial relationship of land to key agricultural infrastructure; and ▪ access between land and key agricultural infrastructure is required on a reasonably frequent basis (monthly).
Low	Grades 4 or 5 agricultural land. Agricultural land holdings: ▪ areas of land which the enterprise is not dependent on the spatial relationship of land to key agricultural infrastructure; and ▪ access between land and key agricultural infrastructure is required on an infrequent basis (monthly or less frequent).
Negligible	Previously developed land with little potential to return to agriculture. Agricultural land holdings: ▪ areas of land which are infrequently used on a non-commercial basis.

Table 18.4.4: Sensitivity Criteria for Recreational Receptors

Sensitivity	Definition Used for Recreational Receptors
Very high	Community land and assets where there is a combination of the following: ▪ complete severance between communities and their land/assets, with little/no accessibility provision; ▪ alternatives are only available outside the local planning authority area; ▪ the level of use is very frequent (daily); and ▪ the land and assets are used by the majority (>=50%) of the community. Walkers, cyclists, horse riders: ▪ national trails and routes likely to be used for both commuting and recreation that record frequent (daily) use. Such routes connect communities with employment land uses and other services with a direct and convenient route. Little/no potential for substitution;

Sensitivity	Definition Used for Recreational Receptors
	▪ routes regularly used by vulnerable travelers such as the elderly, school children and people with disabilities, who could be disproportionately affected by small changes in the baseline due to potentially different needs; and ▪ rights of way crossing roads at grade with >16,000 vehicles per day.
High	Community land and assets where there is a combination of the following: ▪ there is substantial severance between communities and their land/assets, with limited accessibility provision; ▪ alternative facilities are only available in the wider local planning authority area; ▪ the level of use is frequent (weekly); and ▪ the land and assets are used by the majority (>=50%) of the community. Walkers, cyclists, horse riders: ▪ regional trails and routes likely to be used for recreation and to a lesser extent commuting, that record frequent (daily) use. Limited potential for substitution; and ▪ rights of way crossing roads at grade with >8,000 – 16,000 vehicles per day.
Medium	Community land and assets where there is a combination of the following: ▪ there is severance between communities and their land/assets, but with existing accessibility provision; ▪ limited alternative facilities are available at a local level within adjacent communities; ▪ the level of use is reasonably frequent (monthly); and ▪ the land and assets are used by the majority (>=50%) of the community. Walkers, cyclists, horse riders: ▪ public rights of way and other routes close to communities which are used for recreational purposes, but for which alternative routes can be taken. These routes are likely to link to a wider network of routes to provide options for longer recreational journeys, and/or ▪ rights of way crossing roads at grade with >4,000 – 8,000 vehicles per day.
Low	Community land and assets where there is a combination of the following: ▪ limited existing severance between communities and their land/assets, with existing full Disability Discrimination Act compliant accessibility provision; ▪ alternative facilities are available at a local level within the wider community; ▪ the level of use is infrequent (monthly or less frequent); and ▪ the land and assets are used by the minority <=50%) of the community. Walkers, cyclists, horse riders: ▪ routes which have fallen into disuse through past severance or which are scarcely used because they do not currently offer a meaningful route for utility/recreational purposes; and/or ▪ rights of way crossing roads at grade with <4,000 vehicles per day.
Negligible	Community land and assets where there is a combination of the following: ▪ no or limited severance or accessibility issues; ▪ alternative facilities are available within the same community; ▪ the level of use is very infrequent (a few occasions yearly); and ▪ the land and assets are used by the minority (<=50%) of the community. Walkers, cyclists, horse riders: N/A

Magnitude of Impact

18.4.15 The criteria for defining magnitude for agricultural land use and recreational receptors are outlined in Table 18.4.5 and Table 18.4.6 below.

Table 18.4.5: Impact Magnitude Criteria Agricultural Land Use

Magnitude	Definition Used for Agricultural Land Use
High	Soils: ▪ Physical removal or permanent sealing of more than 20 hectares of agricultural land. Agricultural land holdings: ▪ loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements eg direct acquisition and demolition of buildings and direct development of land to accommodate highway assets; and/or ▪ introduction (adverse) or removal (beneficial) of complete severance with no/full accessibility provision.
Medium	Soils: ▪ physical removal or permanent sealing on 1 – 20 hectares of agricultural land; or ▪ permanent loss/reduction of one or more soil function(s) and restriction to current or approved future use. Agricultural land holdings: ▪ partial loss of/damage to key characteristics, features or elements eg partial removal or substantial amendment to access or acquisition of land compromising the viability of agricultural holdings; and/or ▪ introduction (adverse) or removal (beneficial) of severe severance with limited/moderate accessibility provision.
Low	Soils: ▪ temporary loss/reduction of one or more soil function(s) and restriction to current or approved future use. Agricultural land holdings: ▪ a discernable change in attributes, quality or vulnerability, or alteration to one (maybe more) key characteristics, features or elements eg amendment to access or acquisition of land resulting in changes to the operating conditions that do not compromise overall viability of agricultural holdings; and/or ▪ introduction (adverse) or removal (beneficial) of severance with adequate accessibility provision.
Negligible	Soils: ▪ no discernable loss/reduction in soil function(s) that restrict current or approved future use. Agricultural land holdings: ▪ very minor loss or detrimental alteration to one or more characteristics, features or elements eg acquisition of non-operational land or buildings not directly affecting the viability of agricultural holdings; and/or ▪ very minor introduction (adverse) or removal (beneficial) of severance with ample accessibility provision.
No change	Soils: ▪ no loss/reduction of soil function(s) that restrict current or approved future use. Agricultural land holdings: ▪ no loss or alteration of characteristics, features, or elements or accessibility; no observable impact in either direction.

Table 18.4.6: Impact Magnitude Criteria for Recreation

Magnitude	Definition Used for Recreation
High	Community land and assets: ▪ loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements eg direct acquisition and demolition of buildings and direct development of land to accommodate highway assets; and/or ▪ introduction (adverse) or removal (beneficial) of complete severance with no/full accessibility provision. Walkers, cyclists, horse riders: ▪ >500m increase (adverse) or decrease (beneficial) in journey length.
Medium	Community land and assets: ▪ partial loss of/damage to key characteristics, features or elements eg partial removal or substantial amendment to access or acquisition of land compromising the viability of community assets; and/or ▪ introduction (adverse) or removal (beneficial) of severe severance with limited/moderate accessibility provision. Walkers, cyclists, horse riders: ▪ >250m-500m increase (adverse) or decrease (beneficial) in journey length.
Low	Community land and assets: ▪ a discernable change in attributes, quality or vulnerability, or alteration to one (maybe more) key characteristics, features or elements eg amendment to access or acquisition of land resulting in changes to the operating conditions that do not compromise overall viability of community assets; and/or ▪ introduction (adverse) or removal (beneficial) of severance with adequate accessibility provision. Walkers, cyclists, horse riders: ▪ >50m-250m increase (adverse) or decrease (beneficial) in journey length.
Negligible	Community land and assets: ▪ very minor loss or detrimental alteration to one or more characteristics, features or elements eg acquisition of non-operational land or buildings not directly affecting the viability of community assets; and/or ▪ very minor introduction (adverse) or removal (beneficial) of severance with ample accessibility provision. Walkers, cyclists, horse riders: ▪ <50m increase (adverse) or decrease (beneficial) in journey length.
No change	Community land & assets and walkers, cyclists, horse riders: ▪ no loss or alteration of characteristics, features, elements or accessibility; no observable impact in either direction.

Significance of Effect

18.4.16 The significance of the effect upon agricultural land use and recreation has been determined by taking into account the sensitivity of the receptor and the magnitude of the impact. The method employed for this assessment is presented in Table 18.4.7. Where a range of significance levels is presented, the assessment for each effect is based upon expert judgement.

18.4.17 In all cases, the evaluation of receptor sensitivity, impact magnitude and significance of effect has been informed by professional judgement and is underpinned by narrative to explain the conclusions reached.

18.4.18 For the purpose of this assessment, any effects with a significance level of minor or less are not considered to be significant in terms of the EIA Regulations. Effects of moderate significance are identified as having the potential to be significant, but professional judgement has been used to determine where this is the case.

Table 18.4.7: Assessment Matrix

Sensitivity	Magnitude of Impact				
	No Change	Negligible	Low	Medium	High
Negligible	No change	Negligible	Negligible or Minor	Negligible or Minor	Minor
Low	No change	Negligible or Minor	Negligible or Minor	Minor	Minor or Moderate
Medium	No change	Negligible or Minor	Minor	Moderate	Moderate or Major
High	No change	Minor	Minor or Moderate	Moderate or Major	Major or Substantial
Very High	No change	Minor	Moderate or Major	Major or Substantial	Substantial

18.4.19 A description of the significance levels is provided in the bullets below:

- Substantial: Only adverse effects are normally assigned this level of significance. They represent key factors in the decision-making process. These effects are generally, but not exclusively, associated with sites or features of international, national or regional importance that are likely to suffer a most damaging impact and loss of resource integrity. However, a major change in a site or feature of local importance may also enter this category.
- Major: These beneficial or adverse effects are considered to be very important considerations and are likely to be material in the decision-making process.
- Moderate: These beneficial or adverse effects may be important but are not likely to be key decision-making factors. The cumulative effects of such factors may influence decision-making if they lead to an increase in the overall adverse effect on a particular resource or receptor.
- Minor: These beneficial or adverse effects may be raised as local factors. They are unlikely to be critical in the decision-making process but are important in enhancing the subsequent design of the project.
- Negligible: No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

18.5. Assumptions and Limitations of the Assessment

18.5.1 It has not been possible to include an area of land to the south of the M23 spur road within the ALC survey area at this time due to access limitations, as identified on Figure 18.6.2b. However, extensive detailed survey work has been undertaken on adjoining areas of the same soil type and

the availability of existing survey data enables a reasonable preliminary assessment to be made of the likely effects of the Project on agricultural land quality. On this basis, no assumptions and limitations have therefore been identified in the preparation of this chapter with regard to agricultural land use or recreation that would prevent a preliminary assessment of the potential effects being made.

18.6. Baseline Environment

Current Baseline Conditions

Agricultural Land Quality and Soils – Desk Study Information

Geology

18.6.1 Geological information is provided by the BGS Internet Portal and on published geological maps. The 1:50,000 BGS sheet covering the area around Gatwick (Sheet 302 Horsham) identifies that the local bedrock is the Weald Clay. This is a stiff, grey mudstone weathering to a brownish grey clay at the surface. There are bands of clay ironstone within it, but these produce the same kinds of soils as the main mass of mudstone.

18.6.2 Of more consequence in affecting the nature of the soils is the presence or absence of superficial drift. This includes patches of river terrace deposits. Published information on the soils (see below) indicates that much of the Weald Clay in the area is covered by superficial drift, which is too thin to be shown as a separate feature on the geological maps. This is possibly derived, at least partly, from the river terrace materials.

18.6.3 The geological map (Sheet 302 Horsham) also identifies an area of river alluvium along the course of the River Mole and its tributaries.

18.6.4 At the extreme south east of the map are the underlying deposits of the Upper Tunbridge Wells Sand, which forms part of the higher ground (the High Weald) to the south and east of Crawley.

Soils

18.6.5 There is no detailed soil map for the area and so the only published source of information is Sheet 6 (South East England) of the 1:250,000 scale National Soil Map. Figure 18.6.1 provides an extract from the published National Soil Map. It shows geographic groupings of soils called Soil Associations within the study area, usually related to specific parent materials. Within each Association there are likely to be a number of more tightly defined soil types known as Soil Series.

18.6.6 The National Soil Map shows a close correlation with the geology around the existing airport, though with simplification for reasons of scale. There can be a considerable range in the kinds of soils within a particular Association, usually because of local variations in the character and thickness of the superficial drifts, including some not shown on the geological map because they are too thin.

18.6.7 The relationship between geology and soils is shown in Table 18.6.1 below:

Table 18.6.1: Study Area – Soil Associations

Geology	Soil Association Code	Soil Association Name	Brief Description
Weald Clay (with thin superficial drift and patches of thicker drift)	711e and 711i	WICKHAM 1 and WICKHAM 5	Poorly drained clayey soils with slightly more loamy surface horizons and patches of more sandy but poorly drained soils on river terrace deposits
Weald Clay (with little or no superficial drift)	712b	DENCHWORTH	Poorly drained clayey soils
River Terrace Deposits	841d	SHABBINGTON	Poorly drained sandy soils
Alluvium	813d	FLADBURY 3	Poorly drained clayey soils
Upper Tunbridge Wells Sand	572i	CURTISDEN	Poorly and imperfectly drained silty and fine sandy soils

Agricultural Land Classification

18.6.8 The Provisional ALC 1:63,360 scale map for the area, Sheet 170 (London SW), and accompanying report indicate the soils on the Weald Clay, Tunbridge Wells Sand and the various superficial deposits in the area to be graded either undifferentiated subgrade 3 or grade 4 quality land.

18.6.9 The accompanying report identifies that soils developed on the Weald Clay in grade 3, ie those now shown as the WICKHAM and DENCHWORTH Associations are regarded as ‘low in the grade’ with the more clayey ones relegated to grade 4, a grading also applied to the soils on clayey alluvium. This information indicates that the soils from the WICKHAM association, which covers the majority of the agricultural land within Project site, would be expected to be classified as lower quality grade 3 or 4 land and would not therefore comprise the best and most versatile agricultural land.

18.6.10 Since the Provisional Map was published there has been a comprehensive revision to the ALC system and the application of this requires detailed, site-specific information to determine the ALC grade accurately. A number of areas around Crawley, Gatwick and Horsham have been subject to more detailed examination by Defra using the revised ALC system and the results of these surveys (taken from the Defra MAGIC website) are identified in Figure 18.6.2.

18.6.11 These surveys are useful in this area as they include surveys on most of the Soil Associations described above. Virtually all of the agricultural land surveyed in detail has been found to be of lower quality subgrade 3b. This pattern confirms the more subjective assessments made for the Provisional Map of the 1970s and identifies that the land in the vicinity of the existing airport is predominantly of lower quality and does not comprise the best and most versatile agricultural land.

Agricultural Land Quality and Soils - Site Survey

18.6.12 Survey work has been undertaken for this Project in the following areas:

- areas affected by elements of the Project where soils and agricultural land would be permanently lost; and
- construction areas where soils would be temporarily disturbed during the construction period.

18.6.13 There are additional land parcels identified as potential areas for environmental mitigation that also comprise agricultural land. However, these have not been included within the detailed ALC survey, as the soil resources within these areas would remain *in situ* to facilitate the implementation of the environmental mitigation measures and the quality of the land within these areas would be retained.

18.6.14 The results of the detailed survey work are shown on Figure 18.6.2. The areas of surveyed land have been found to comprise entirely lower quality Subgrade 3b agricultural land. This is entirely consistent with the findings of the detailed survey work carried out by Defra on extensive areas of surrounding land, also shown on Figure 18.6.2.

18.6.15 The survey work to the north west of the airport shown on Figure 18.6.2 identified soils typical of the Denchworth soil associations. Profiles typically comprise heavy clay loam topsoils overlying slowly permeable and mottled clay subsoils at a depth of 20- 25 cm.

18.6.16 The surveyed land within the ownership of Gatwick to the east of the railway as shown on Figure 18.6.2 identified soils typical of the Wickham Soil Association. Profiles typically comprise a dark brown medium to heavy clay loam topsoil overlying a thin mottled heavy clay loam upper subsoil horizon and a slowly permeable mottled clay horizon at depth of 30 – 40 cm.

Farm Holdings – Desk Study Information

18.6.17 Defra farming statistical data produced for local authority areas from the June 2016 dataset (Defra, 2016) provide information on the distribution of agricultural land use within the areas likely to be affected by the Project. Table 18.6.2 provides a comparison of local authority agricultural land use with the distribution of agricultural land use in England as a whole.

Table 18.6.2: Defra Statistics for Agricultural Land Use 2016

	Cereals and Arable Cropping (hectares)	%	Fruit and Vegetables (hectares)	%	Grassland (hectares)	%
England	2,616,937	37	124,913	3	4,387,975	60
Crawley and Mid Sussex	2,318	19	116	<1	9,693	80
Horsham	4,220	18	235	1	18,675	81
Mole Valley	2,352	24	155	2	7,044	74
Tandridge	2,170	25	13	<1	6,403	75
Reigate and Banstead, Epsom and Ewell	794	24	0		2,575	76

18.6.18 The statistical data produced by Defra indicate that within the local authorities where agricultural land is affected by the Project it is predominantly used for grassland-based livestock agriculture.

There is a much higher percentage of this type of land use in these administrative areas than that identified within England as a whole.

Farm Holdings – Project Information

18.6.19 The distribution of agricultural land holdings that may be affected by the Project based on site visits and liaison with individual landowners is identified on Figure 18.6.3.

18.6.20 Holding 1 comprises land to the north and south of the M23 spur between the M23 Junction and the south terminal roundabout. The land to the north likely to be affected by the Project is either non-agricultural land or comprises an area of land that has been recently restored following the M23 Smart motorway works. To the south, the land is used for hay and/or horse grazing. The landowner does not farm the land and the land is let for hay or horse grazing on the basis of short term agreements.

18.6.21 The strip of land identified as Holding 2 forms part of the holding that includes the commercial property immediately to the north of it. The area is not used for agricultural production.

18.6.22 Holding 3 is entirely grassland and is used for hay and/or regular horse grazing and is used in conjunction with a livery yard to the north of the area. The land is owned by Surrey County Council and let out on a short term basis. The area forms part of the proposed Horley Business Park site, which is designated in planning policy but for which, as yet, no planning application has been submitted.

18.6.23 Holding 4a forms part of the Gatwick land holding. This area is grazed intermittently by a local livestock farmer on the basis of a short term agreement.

18.6.24 Holding 4b comprises an area of land recently purchased by Gatwick Airport. The grassland area is cut regularly, but is not used for any agricultural purpose.

18.6.25 Holding 5 is also owned by Surrey County Council and forms part of a larger block of land that comprises approximately 100 acres (40 hectares). The land is farmed by a tenant as part of a livestock based enterprise.

18.6.26 Holding 6 comprises land that forms part of the Aviation Museum holding. This land is not used for agricultural production, but is mown regularly and used as part of the museum facility.

18.6.27 Holding 7 comprises land that forms part of a land holding based at Brook Farm. The holding comprises areas of land to the south and north of the Horley Road. These areas comprise a total of approximately 50 acres (20 hectares) of land. The buildings and land within the holding support a number of different enterprises including some commercial units based at the farm, a clay pigeon shoot and grassland cut for hay or let for grazing.

Recreation

Public Rights of Way

18.6.28 The following public rights of way lie within the Project site boundary in West Sussex as shown on Figure 18.6.4.

- To the north of the airport, the Sussex Border Path, a long distance walk, runs generally from west to east along the alignment of public footpaths 347Sy (east of Horley Road);

346Sy (south of Charlwood Road and Povey Cross Road); and 346-2Sy and 355-1Sy (south of the A23).

- Public footpath 355Sy runs east-west across the railway line on a footbridge from its junction with 360Sy to its junction with the A23.
- Public footpath 358Sy runs south-westwards from the B2036 to its junction with public footpath 359Sy.
- Public footpath 359Sy runs westwards from the B2036 and then southwards adjacent to the existing car parking areas to its junction with Radford Road.
- Public footpath 360Sy runs south from Airport Way to the east of the railway line and through the existing car parking areas to its junction with 359Sy/361Sy. The Gatwick Station improvements require the current alignment of this public right of way to be moved in order to enable the construction of the new station concourse. This requires a diversion from the back of platform 7 to a route through the passenger terminal building, which is expected to be completed by 2022.
- Public footpath 360-1Sy runs generally south west and south from its junction with public footpath 359Sy to its junction with Radford Road.
- Public footpath 361Sy runs to the south of the existing car parking areas between public footpaths 359Sy and 360Sy.
- To the west of M23 Junction 9, public footpath 367Sy runs to the south of the M23 spur and then turns south outside the Project site boundary to meet Fernhill Road.
- To the south of the airport, public bridleway 352Sy runs northwards from the A23 to Church Road.

18.6.29 The following public rights of way lie within the Project site boundary in Surrey as shown on Figure 18.6.4.

- To the north of the M23 spur road, the Sussex Border Path runs along the alignment of Burstow Footpath 368, Horley Footpath 368 and Horley Footpath 367 up to the B2036.
- West of the B2036, the Sussex Border Path runs along the alignment of Horley Footpath 362a to the north of the Project site boundary and then crosses over the railway line and south along Horley Footpath 355a to the county boundary.
- To the east of the railway line, Horley Footpath 360 runs southwards to the county boundary to the north of Airport Way.
- To the north east of the Longbridge Roundabout in Horley, FP574 runs northwards along the boundary of the Project site between the A23 and Church Road.

National Cycle Routes

18.6.30 National Cycle Route 21 (NCR21) runs south from Greenwich out of London through Lewisham (the Waterlink Way) to Crawley, and then via East Grinstead and Eridge to Heathfield and Eastbourne. From Crawley it runs northwards between the A23 London Road and the railway line as a traffic free route to the east of the main airport campus. It then follows the alignment of the Gatwick Stream, crossing Airport Way to the north of the airport via a subway which exits in Riverside Park in Horley. NCR21 continues to follow the Gatwick Stream within the northern area of the park, becoming an on-road route between Riverside and Crescent Way (see Figure 18.6.4).

18.6.31 NCR21 provides an important non-vehicular route between Horley, Crawley and Gatwick Airport for use by cyclists and walkers. The West Sussex cycle journey planner shows NCR21 crossing a

local cycle route near to Horley railway station, which runs to the east over Balcombe Road and the M23 and to the west over Brighton Road and Reigate Road. It is also crossed by the Sussex Border Path, a long distance walk, just north of the South Terminal.

18.6.32 Recreation surveys were carried out on three days between May and August 2019 to provide an indication of the quantity and characteristics of the usage of NCR21 and the wider park on a weekday, a weekend day and on a weekend bank holiday day. The results of these surveys are described in Appendix 18.6.3 and concluded the following.

- NCR21 and the wider park are well used by pedestrians and cyclists on all days of the week.
- It was observed on all survey days that the car park within Riverside Garden Park is also well used, with pedestrians observed accessing the western area of the park away from NCR21. This use was not recorded as part of the surveys.
- The users comprised those who use NCR21 to get to and from their place of work, either on foot or by cycle and local residents who use the route and the wider park as a recreational resource.
- During the week it was observed that Riverside Garden Park is also used as a resource for airport workers during lunch breaks.
- The surveys identified a number of pedestrians who use the park as a resource either between flights at the airport or as a means of accessing local accommodation between connecting flights where these require an overnight stay.

18.6.33 Both the level of use and range of activities recorded on the survey days at this location and the characteristics of the users are likely to reflect those that may be expected during similar times of the week throughout the year and under similar dry and warm weather conditions. It is recognised that the numbers of people using Riverside Garden Park may have altered during the current COVID pandemic, with the potential for more recreational users and less airport-related use. However, it is anticipated that once COVID restrictions have been fully eased the overall level and type of use will be similar to that recorded in the 2019 survey.

Walking, Cycling and Horse Riding Routes

18.6.34 The main promoted walking route close to Gatwick Airport is the Sussex Border Path (see Figure 18.6.4). This route in total extends to approximately 240 km (150 miles) around the inland boundary of the county of Sussex, from Thorney Island, near Emsworth to Rye in East Sussex. It has been waymarked by Sussex Ramblers, who provide descriptions of each part of the route on their website.

18.6.35 Around Gatwick Airport, the Sussex Border Path runs along the alignment of existing public footpaths in Surrey and West Sussex. From the M23 it runs to the north of the M23 spur road along Surrey public footpaths 367 and 368, and then follows public footpath 362a before crossing the railway line and joining public footpath 355a to the west of Riverside Garden Park and running south to the county boundary to the north of Airport Way. In West Sussex it crosses Airport Way in a subway along the alignment of public footpath 355-1Sy and then follows public footpath 346-2Sy for approximately 2.45 km around the northern perimeter of the airport to the south of the A23 and Povey Cross Road. It continues to run between the airport and Charlwood Road and Horley Road along public footpaths 346Sy and 347Sy, which follow the approximate alignment of the River Mole. The Sussex Border Path then crosses Horley Road into Surrey and runs westwards along public footpath 344 towards Charlwood.

18.6.36 The Millennium Trail is a 28 km long distance path from Banstead Downs to Horley and was created by Reigate and Banstead Borough Council to mark the new century. In the vicinity of Gatwick Airport, the Millennium Trail largely follows the same route as the Sussex Border Path and finishes in Riverside Garden Park (see Figure 18.6.4). In 2016, Reigate and Banstead Borough Council published a guided and self-guided walks programme, which included events in Riverside Garden Park, but this does not appear to have been published since.

18.6.37 The Gatwick Greenspace Partnership publishes a calendar of walks covering the area between Horsham, Crawley, Horley, Reigate and Dorking. The project is supported by all local authorities and GAL and is managed by the Sussex Wildlife Trust. The 2019/2020 programme did not list any walks within the Project site boundary but there were some in the surrounding settlements and countryside including at Charlwood and Rusper. A 2021 programme of walks has not yet been published.

Public Open Space

18.6.38 Riverside Garden Park in Horley is designated as urban open space of high value by Reigate and Banstead Borough Council in their Urban Open Space Assessment and Review (Reigate and Banstead Borough Council, 2018) and forms part of the Riverside Green Chain. It is located on the south western edge of Horley between areas of residential development to the north east and the A23 and Gatwick Airport to the south west (see Figure 18.6.5). It is owned by Reigate and Banstead Borough Council, who are responsible for the day to day management of the park.

18.6.39 The park, which covers an area of approximately 10 hectares, was originally part of Horley Common. The history of the site is described on the Horley Town Council website which explains that:

'Later it was enclosed and farmed, before a racecourse was developed on neighbouring land. In the 1930s, the racecourse land was incorporated in the new Gatwick Aerodrome. Since then the site boundaries have been fixed by the expansion of Horley and Gatwick Airport. The adjacent residential development took place in the 1950-60s'.

18.6.40 Today, Riverside Garden Park comprises public open space bounded to the north by the Gatwick Stream and features areas of woodland and a man-made lake. Despite the proximity of the A23 and the airport, these features are largely screened from view by embankments and tree planting. Horley Town Council describes the park as being a favourite local dog walking venue, with fishing popular along the Gatwick Stream and around the lake. In addition, cyclists use NCR21 to get to and from Gatwick Airport.

18.6.41 Riverside Garden Park narrows to the north west as it follows the River Mole to the A23. On the northern side of the A23 at this location, other areas of open space lie within the Project site boundary. These areas, which lie to the east of the River Mole, comprise St Bartholomew's Church and the former Horley Anderson Centre and Playing Fields and are also designated as urban open space of high overall value by Reigate and Banstead Council in the Urban Open Space Assessment and Review (Reigate and Banstead Borough Council, 2018) (see Figure 18.6.5). They are also part of the Riverside Green Chain, a Reigate and Banstead Borough Council commitment to safeguard the riverine environment around Horley and provide opportunities for both formal and informal recreation.

Future Baseline Conditions

Initial Construction Phase: 2024-2029 and First Full Year of Opening: 2029

Agricultural Land Use

18.6.42 There are unlikely to be any significant changes to the agricultural land use baseline described in this chapter during the period up to 2029 as a result of future improvements within Gatwick Airport itself, in relation to current planning policy or known trends in agriculture and land use. Similarly, it is not anticipated that agricultural land uses resources within the study area will be specifically vulnerable to the effects of climate change during this period.

Recreation

18.6.43 There are unlikely to be any significant changes to the recreational baseline described in this chapter during the period up to 2029 as a result of future improvements within the airport itself or arising from current planning policy (which includes measures to protect and enhance recreational resources, including in relation to new development, to around 2030). Similarly, it is not anticipated that recreational resources within the study area will be specifically vulnerable to the effects of climate change during this period.

Interim Assessment Year: 2030-2032

Agricultural Land Use

18.6.44 There are unlikely to be any significant changes to the agricultural land use baseline described in this chapter during the period up to 2032 as a result of future improvements within Gatwick Airport itself, in relation to current planning policy or known trends in agriculture and land use. Similarly, it is not anticipated that agricultural land uses resources within the study area will be specifically vulnerable to the effects of climate change during this period.

Recreation

18.6.45 There are unlikely to be significant changes to the recreational baseline described in this chapter during the period up to 2032 as a result of future improvements within the airport itself. However, by this date it is expected that the trend towards warmer, drier summers may result in an extension to the summer season for outdoor activities, so it is likely that more people will take part in outdoor recreation. These drier conditions may lead to some depletion of existing vegetation and soil erosion which might affect local recreational resources. In such cases, it has been assumed that appropriate measures would be established by the relevant authorities/bodies to manage these changes and these would be incorporated into emerging local planning policy from around 2030.

Design Year: 2033-2038

Agricultural Land Use

18.6.46 There are unlikely to be significant changes to the agricultural land use baseline described in this chapter during the period up to 2038 as a result of future improvements within the airport itself.

18.6.47 A report prepared for Defra and the Welsh Government 2014, based on research undertaken by Cranfield University and ADAS (Keay *et al.,* 2014) considers the impact of climate change on the capability of land for agriculture.

18.6.48 In terms of the quality of agricultural land and the proportions on best and most versatile land, the findings of the report *'suggest that the greatest impact on the proportion of BMV in England and Wales will take place after 2030'.*

18.6.49 For sites which are affected by soil wetness, the report concluded that the quality of the land would be '*Largely unaffected over most of England and Wales mainly because, even though the start and end dates of field capacity are likely to change, the duration remained constant*'.

18.6.50 Where droughtiness is the main limitation, the retention of high quality land would be likely to become more dependent on the use of irrigation to maintain productivity and versatility in agricultural land use.

18.6.51 Overall the report concludes that '*the findings of this project do not undermine the current use of the ALC system within land use planning*'.

18.6.52 In this case therefore, where soil wetness is the main limiting factor, the quality of the land would, based on this recent research, be unlikely to be significantly affected by climate change.

Recreation

18.6.53 There are unlikely to be significant changes to the recreational baseline described in this chapter during the period up to 2038 as a result of future improvements within the airport itself. However, the trend towards warmer, drier summers is predicted to continue resulting in an extension to the summer season for outdoor activities, with the potential for greater participation in outdoor recreation. These continuing drier conditions may lead to some depletion of existing vegetation and soil erosion which might affect local recreational resources. In such cases, it has been assumed that appropriate measures would be established by the relevant authorities/bodies to manage these changes and these would be incorporated into emerging local planning policy.

18.7. Key Project Parameters

18.7.1 The assessment has been based on the parameters identified within Chapter 5: Project Description.

18.7.2 Table 18.7.1 below identifies the key parameters relevant to this assessment. Where options exist, the maximum design scenario selected is the one having the potential to result in the greatest adverse effect on an identified receptor or receptor group. Effects of greater adverse significance are not predicted to arise should any other option identified in Chapter 5 be taken forward in the final design of the Project.

Table 18.7.1: Maximum Design Scenarios

Potential Impact	Maximum Design Scenario	Justification
Initial Construction Phase: 2024-2029 (ie up to first opening of northern runway)		
Area within Project site boundary	838 hectares	This is the maximum area affected by land take or direct construction activity. Within this area, effects on agricultural land and rights of way have been considered, although in reality much of this area consists of the existing operational airport and therefore, most impacts would arise in the areas outside the existing operational airport.
Permanent land take from agricultural land	12.4 hectares	Area of existing agricultural land to be required on a permanent basis.
Temporary land take from agricultural land	3.3 hectares	Area of existing agricultural land to be required on a temporary basis.
Loss of public open space and disruption to existing public rights of way and other linear recreational routes	North and South Terminal roundabout improvements	These works would represent the maximum land take and area of disruption, which may require widening of the highway or roundabout into the adjacent areas of public open space, and temporary/permanent effects on the alignment of public rights of way and other linear recreational routes.
2030-2032		
Loss of public open space and disruption to existing public rights of way and other linear recreational routes	Ongoing North and South Terminal roundabout improvements and works to Longbridge Roundabout.	These works would represent the maximum land take and area of disruption, which may require widening of the highway or roundabout into adjacent areas of public open space, and temporary/permanent effects on the alignment of public rights of way and other linear recreational routes.
2033-2038 (up to construction of final elements)		
Restoration of temporary land take from agricultural land	3.3 hectares	Restoration of areas of agricultural land temporarily required for highway improvement works.
Design Year: 2038 (ie operational)		
Parameters assumed would be as above.		

18.8. Mitigation and Enhancement Measures Adopted as Part of the Project

18.8.1 A number of measures have been designed into the Project to reduce the potential for impacts on agricultural land use and recreation. These are listed in Table 18.8.1. The measures relating to construction are also set out in the Outline Code of Construction Practice (see Appendix 5.3.1).

Table 18.8.1: Mitigation and Enhancement Measures

Measures Adopted as Part of the Project	Reason
Mitigation	
A soil management strategy to ensure the conservation of soil resources; avoidance of damage to soil structures; maintenance of soil drainage; and the reinstatement, where required, of soil profiles as near as possible to their former condition.	To maintain the quality of agricultural land temporarily affected by disturbance during the construction period.
Implementation of measures to reduce, as far as possible, the effects of construction activities on farm holdings. Where appropriate, these would include the maintenance of farm access locations; provision of appropriate fencing; maintenance of water supplies; co-ordination of timing of construction works to facilitate farming operations; and measures to address the potential risks of the spread of animal and plant diseases.	To maintain the operation of farming enterprises during the construction period.
Provision of replacement public open space and/or improvement/enhancement of current public open space facilities to mitigate for the loss of land designated as public open space which it has been necessary to acquire and use to facilitate the delivery of the Project.	Where land used by the community, including public open space, is taken for a road scheme it will generally be necessary to provide exchange land which must not be smaller in area and must be equally advantageous to the users of the land required by the road.
Provision of a permanent diversion to the Sussex Border Path to the south of the A23 arising from the new North Terminal junction.	To maintain public access along the Sussex Border Path during construction and operation.
Provision of a pedestrian link between the footway on the northern side of the A23 near the Longbridge Roundabout into Riverside Garden Park.	To provide a public benefit through the provision of an additional pedestrian route into Riverside Garden Park.
Provision of an additional pedestrian route linking Riverside Garden Park with the Sussex Border Path to the north of the A23.	To provide a public benefit through the provision of an additional pedestrian route through Riverside Garden Park to link to the Sussex Border Path.
Management measures to avoid severance and safely maintain public access along NCR21 and the Sussex Border Path during construction activities associated with the North Terminal roundabout improvements.	NCR21 is a national long-distance cycle route and the Sussex Border Path is a long distance promoted route. These routes should remain open during construction.

Measures Adopted as Part of the Project	Reason
Management measures to avoid severance and safely maintain public access along the Sussex Border Path during construction activities associated with the South Terminal roundabout improvements.	The Sussex Border Path is a promoted long-distance route and should remain open during construction.
Management measures to safely maintain public access along the public footpaths around the perimeter of Pentagon Field during construction of the new car parking area.	These footpaths form part of, and link to, other routes within the public rights of way network and should remain open for use during construction.
Management measures or temporary diversions to safely maintain access along the public rights of way in the vicinity of the proposed construction compound to the south of the M23 Spur, east of the South Terminal roundabout.	To maintain pedestrian access north from Fernhill Road and then west to Balcombe Road.
Monitoring	
The soil management strategy (see mitigation measures above) would include the provision of suitably qualified person to monitor the quality of the soil stripping storage and restoration operations	To maintain the quality of agricultural land temporarily affected by disturbance during the construction period.
Enhancement	
Provision of new recreational route around the proposed flood compensation area to the east of Museum Field to enhance local public access opportunities.	To provide a circular route opportunity to benefit to local communities for health and well-being.

18.9. Assessment of Effects

Initial Construction Phase: 2024-2029

Agricultural Land Use

Agricultural Land Quality

18.9.1 During this phase of the Project there would be temporary agricultural land take associated with the start of construction of the South Terminal roundabout improvements. This could affect land to the north of the existing South Terminal roundabout. Detailed survey work carried out by Defra indicates that the area to the north of South Terminal roundabout comprises entirely lower quality Subgrade 3b land.

18.9.2 Within these areas, there would be a temporary loss of approximately 3.3 hectares of lower quality Subgrade 3b land. Taking into account the amount of land affected and its quality, the loss is assessed as a medium long term temporary magnitude of impact on a receptor of medium sensitivity. The significance of this temporary loss of agricultural land quality is therefore assessed to be of **moderate adverse** significance. In this instance, this is not considered to be significant in terms of the EIA Regulations, as no best and most versatile land resource (Grades 1, 2 or 3a land) is affected.

18.9.3 It is assumed that the permanent loss of soils and agricultural land quality would take place during this phase and that there would be permanent land take of approximately 13.2 hectares during this period. This would be primarily associated with the development of surface parking on Pentagon Field, the ground lowering (to create a flood compensation area) within Museum Field, land required for the South Terminal roundabout and Longbridge Roundabout improvements (and associated drainage works). The detailed ALC survey of the majority of these areas has shown them to comprise entirely lower quality Subgrade 3b land. It has not been possible to survey the land to the north of the Longbridge Roundabout but this comprises soils from the Wickham 1 soil association, which is assessed as likely to comprise entirely lower quality Subgrade 3b land, limited by susceptibility to soil wetness.

18.9.4 The loss of this land is assessed as a medium permanent magnitude of impact on a receptor of medium sensitivity. The significance of this permanent loss of agricultural land quality is therefore assessed to be of **moderate adverse** significance. This is not considered to be significant, as no best and most versatile land resource (Grades 1, 2 or 3a land) is affected.

Farm Holdings

18.9.5 There is potential for temporary disruption to Holding 3 which would be affected by construction requirements associated with the South Terminal roundabout improvements. This would affect an area of approximately 3.3 hectares.

18.9.6 The owner of this holding does not operate a farming enterprise and the land is let on short term arrangements, mainly as grazing land for horse grazing and hay making. The temporary loss of this area of land would not cause severance from the remainder of the land holding. The temporary loss of land due to potential construction requirements is assessed to have a low magnitude of impact on areas of medium sensitivity grassland use. The temporary effect of the loss of these areas is therefore assessed to be of **minor adverse** significance. This is not considered to be significant in terms of the EIA Regulations.

18.9.7 Permanent loss of agricultural land would also occur during this phase. This would include the following land holdings.

- Holding 1: A strip of land to the north of the M23 spur, which comprises a non-agricultural area, would be permanently affected.
- Holding 2: A strip of grassland north of the M23 spur, which is not used for agricultural production, would be permanently affected.
- Holding 3: Permanent requirement for an area of approximately 3.6 hectares of land associated with the South Terminal roundabout improvements. This land is currently let by the landowner for horse grazing and/or hay making.
- Land within the Gatwick land holding, Holding 4a and 4b: Area 4a is currently let on a short term basis for cattle grazing and area 4b, a recent addition to the Gatwick estate, is not being used for agricultural production.
- Holding 5: Approximately 0.9 hectares required for junction improvement and environmental mitigation works associated with the road junction works at Longbridge roundabout. This area of represents a total of less than 3% of the holding tenanted from the landowner.
- Land within Holding 6. This area of approximately 7.1 hectares forms part of the Aviation Museum land holding, which does not form part of a farming enterprise.

- Land within Holding 7. This area of approximately 10.7 hectares of land forms part of the Brook Farm holding. The Project could affect the current clay pigeon shooting location and areas of grass keep that are let to local farmers.

18.9.8 The permanent loss of land from these holdings would have limited impacts on the operation of Holdings 3, 5 and 7, where agricultural operations are taking place, with the enterprises within Holding 7 potentially most affected by the potential land take associated with the provision of environmental mitigation. There would be no effect on agricultural operations associated with the loss of land from holdings 1, 2, 4 and 6.

18.9.9 The permanent loss of a strip of approximately 3.6 hectares from Holding 3 would not affect the continued use of the remaining areas of these fields for horse grazing or hay making.

18.9.10 The loss of approximately 0.9 hectares from Holding 5, for highway improvements and environmental mitigation works would affect an area within a single field of a larger tenanted landowner where the current livestock-based operation would not be jeopardised by this limited loss of land and where there would be no severance from the area of the remaining holding.

18.9.11 The land within Holding 7 is not used by the owner as part of a larger agricultural enterprise but is partially used for a clay pigeon shoot operation with other areas let out to local farmers. Whilst there would be a loss of income to the owner associated with the permanent loss of this land, it is not being actively farmed or run as part of a productive agricultural enterprise by the owner of the holding.

18.9.12 It is assessed that these effects would overall have a low permanent magnitude of impact on enterprises of a medium sensitivity.

18.9.13 The overall significance of effect arising from the permanent loss of land from these holdings is therefore assessed to be of **minor adverse** significance. This is not considered to be significant in terms of the EIA Regulations.

Recreation

South Terminal

18.9.14 There is the potential for disruption to access along the following public rights of way towards the end of the initial construction phase as a result of the commencement of works on the South Terminal roundabout improvements and the associated construction compound which may be located to the south of the M23 Spur:

- the Sussex Border Path, which runs to the north of the M23 Spur along the alignment of public footpaths 367 and 368; and
- public footpath 367Sy which runs in a north-south direction between the M23 Spur and Fernhill Road.

18.9.15 To minimise the disruption to the Sussex Border Path it is proposed to maintain the route along its current alignment outside the perimeter fencing of the construction works for public safety. It is also proposed to implement the following public access improvements during this period for the benefit of local communities for health and well-being within the Project site boundary:

- Provision of new circular recreational route around the flood compensation area to the east of Museum Field, with a link to the existing alignment of the Sussex Border Path.

18.9.16 With regards to public footpath 367Sy, it may be necessary to temporarily divert the northern part of the route that falls within the construction compound and that section that currently runs to the south of the M23 Spur. If this is required, it is proposed that the public footpath is temporarily diverted westwards along the edge of the Project site boundary to meet its existing alignment to the east of Balcombe Road. This would not result in any change to the length of the route.

18.9.17 There is also the potential for the disruption to the existing public footpath (359Sy) that runs along the boundary of the Pentagon Field during the construction activities associated with the new surface decked car parking. From Balcombe Road, the public footpath runs along an existing surfaced track and would be separated from the construction site by an existing hedgerow. It also runs through existing woodland planting along part of its route alongside the existing South Terminal car parks but where the route is more open it is proposed that it is maintained along its existing alignment outside the perimeter fencing on the construction site for the safety of pedestrians. To mitigate against any disruption to the use of this public footpath, it is proposed that the route would continue to be maintained along its existing alignment outside the perimeter fencing on the construction site for the safety of pedestrians.

18.9.18 The sensitivity of the promoted Sussex Border Path is assessed as medium, as it is a promoted route approximately circumnavigating the county, used for recreational purposes with links to the wider network of routes. The sensitivity of the other public rights of way and the proposed new circular route which link to the Sussex Border Path are also assessed as medium. The magnitude of the impact on all the existing routes, which would either be maintained along their existing alignment or temporarily diverted with no significant change in length, is assessed as low (adverse). The provision of a new permanent circular route and links to the Sussex Border Path would result in a low (beneficial) magnitude of impact and would be of medium sensitivity.

18.9.19 Taking all these factors into account, the temporary effects on public rights of way during construction are assessed to be of **minor adverse** significance, and the overall effect on recreational routes and facilities during operation is assessed to be of permanent **minor beneficial** significance. This is not considered to be significant in terms of the EIA Regulations.

North Terminal

18.9.20 The North Terminal roundabout improvements are anticipated to be commenced in 2029. This is likely to include a new grade-separated junction as detailed in Chapter 5: Project Description. It is anticipated that these works would be generally undertaken within the existing highway boundary, subject to approval by Highways England, although there may be some encroachment into southern fringe of Riverside Garden Park.

18.9.21 These works have the potential to result in the following impacts on recreational resources:

- The permanent loss of approximately 0.75 hectares of public open space along the southern boundary of Riverside Garden Park bringing the highway boundary close to the south eastern corner of the lake and resulting in the loss of mature vegetation along the existing highway embankment. Together, these changes would reduce the overall area of open space and change the amenity of the southern area of the park as a result of changes to the visual and acoustic environments (see Chapters 8 and 14 of the PEIR) but it is anticipated that it would be possible to maintain a pedestrian route along the southern edge of the lake.
- There would be no change to the alignment of NCR21 within the south eastern corner of Riverside Garden Park and under the existing A23 during the construction works. However,

there is the potential for some changes to the amenity of the route in this location (see Chapter 8 of the PEIR).

- A section of the existing route of the Sussex Border Path to the south of the A23 would be partly within the land take area for the new junction.

18.9.22 To mitigate for these impacts the following measures have been incorporated into the Project design.

- New areas of public open space would be created totalling a minimum of 0.75 hectares (or an area equivalent to the total loss of public open space), with links to the existing area of Riverside Garden Park, St Bartholomew's Church and the former Horley Anderson Centre and Playing Fields, and the residential areas of Horley to the north and east.
- It is also proposed to make a commitment towards improvements/enhancements within Riverside Garden Park in consultation with Reigate and Banstead Borough Council.
- Provision of a permanent diversion to the Sussex Border Path to the south of the A23 arising from the new North Terminal roundabout.
- Provision of a pedestrian link between the footway on the northern side of the A23 footway near the Longbridge Roundabout into Riverside Garden Park.
- Provision of an additional pedestrian route linking Riverside Garden Park with the Sussex Border Path to the north of the A23.

18.9.23 The sensitivity of the designated open space within Riverside Garden Park and the promoted Sussex Border Path is assessed as medium, as they are both well used resources by the surrounding communities and visitors.

18.9.24 The magnitude of the impact on Riverside Garden Park is assessed to be medium adverse. The loss of land would not adversely affect the integrity of this resource and would be mitigated by the provision of new areas of public open space which would serve the local community, although these would not be immediately contiguous with the park. There would also be a change to the amenity of the southern area of the park, predominantly as a result of changes to the visual environment both during construction and in operation until new highway planting matures. However, improvements/enhancements within the park to meet the needs of all the users are anticipated. Taking these factors into account, the effect on Riverside Garden Park is assessed to be of permanent **moderate adverse** significance. This is considered to be significant in terms of the EIA Regulations.

18.9.25 The magnitude of the impact on the alignment of the Sussex Border Path in the maximum design scenario is assessed to be low beneficial. An existing section of the route would be lost but the amenity of the Sussex Border Path at this location within the airport is not visually attractive, and there is the opportunity to improve the experience of users with a more attractive permanent on-airport diversion. This diversion would be put in place prior to the commencement of construction works to maintain access along the Sussex Border Path during this phase of the Project. The provision of an additional pedestrian route within Riverside Garden Park from the A23 footway near to the Longbridge Roundabout would provide an alternative link to the Sussex Border Path from the residential areas of Horley, which would be to the benefit of the local and wider community. Sensitivity would be medium. Taking these factors into account, the effect on the Sussex Border Path is assessed to be of permanent **minor beneficial** significance. This is not considered to be significant in terms of the EIA Regulations.

Further Mitigation and Future Monitoring

18.9.26 No further mitigation or monitoring measures with regard to agricultural land use receptors are proposed.

Significance of Effects

18.9.27 No further mitigation or monitoring is required. Therefore, the significance of effects would remain as presented above.

2030 - 2032

Agricultural Land Use

Agricultural Land Quality

18.9.28 The assessment of effects for the temporary and permanent loss of land would be the same as for the 2024-2029 initial construction phase.

Farm Holdings

18.9.29 The assessment of effects for the temporary and permanent loss of land would be the same as for the 2024-2029 initial construction phase.

Recreation

18.9.30 The North and South Terminal junction improvements which would commence towards the end of the initial construction phase, are anticipated to be completed by 2032. The impacts arising as a result of these works would continue, as identified above.

18.9.31 Works to the Longbridge Roundabout are anticipated to take place between 2030 and 2032. These may impact an approximate area of 0.1 hectares on the southern part of areas of public open space (St Bartholomew's Church and the former Horley Anderson Centre and Playing Fields) to the north of the A23 and east of the River Mole.

18.9.32 To mitigate for these impacts the following measures have been incorporated into the Project design, in addition to those identified above.

- New areas of public open space would be created totalling a minimum of approximately 0.1 hectares (or an area equivalent to the total loss of public open space), with links to the existing area of Riverside Garden Park, St Bartholomew's Church and the former Horley Anderson Centre and Playing Fields, and the residential areas of Horley to the north and east.

18.9.33 The sensitivity of the designated open space within St Bartholomew's Church and the former Horley Anderson Centre and Playing Fields is assessed as medium, as it is a well-used resource by the surrounding communities and visitors.

18.9.34 The magnitude of the impact on the areas of public open space at St Bartholomew's Church and the former Horley Anderson Centre and Playing Fields is assessed to be low medium term adverse. The loss of land would not adversely affect the integrity of this resource and would be mitigated by the provision of new areas of public open space which would serve the local community, and which would be contiguous with the existing resource. There may be some change to the amenity of the southern areas of the public open space, predominantly as a result

of changes to the visual and acoustic environments both during construction and in operation. Taking these factors into account, the effect on these areas of public open space is assessed to be of long term **minor adverse** significance.

Further Mitigation and Future Monitoring

18.9.35 No further mitigation or monitoring measures with regard to recreational or agricultural land use receptors are proposed.

Significance of Effects

18.9.36 No further mitigation or monitoring is required. Therefore, the significance of effects would remain as presented for the 2029 – 2032.

2033 - 2038

Agricultural Land Use

18.9.37 During this phase, it is anticipated that the temporary areas of agricultural land required in connection with the provision of the new grade-separated junctions as part of the highway improvement works would be restored (as the works on the South Terminal roundabout improvements together with the North Terminal roundabout improvements and Longbridge Roundabout improvements are completed). The implementation of best practice techniques, which would be outlined in the soil management strategy (see Table 18.8.1), would enable these temporary areas to be restored to their former agricultural use as part of Landholdings 1 or 3. Therefore, there would be a no change magnitude of impact and medium sensitivity and therefore significance of effect of **no change** (compared to the baseline situation) in either the agricultural land quality or farming potential of these areas following completion of the restoration period.

Recreation

18.9.38 It is anticipated that the South and North Terminal junction improvements and the works to the Longbridge Roundabout would all be completed by 2032 and therefore there would be no further effects on recreational resources arising from the construction works associated with these surface access works. Any changes to the amenity of recreational resources as a result of changes to the visual and acoustic environments are addressed in Chapters 8 and 14 of the PEIR.

Further Mitigation and Future Monitoring

18.9.39 No further mitigation or monitoring measures with regard to recreational or agricultural land use receptors are proposed.

Significance of Effects

18.9.40 No further mitigation or monitoring is required. Therefore, the significance of effects would remain as presented above.

Design Year: 2038

Agricultural Land Use

18.9.41 No further effects on agricultural land use resources are anticipated as a result of the operation of the Project in the Design Year 2038.

Recreation

18.9.42 No further effects on recreational resources are anticipated as a result of the operation of the Project in the Design Year 2038.

18.10. Potential Changes to the Assessment as a Result of Climate Change

18.10.1 As set out in the Future Baseline section (Section 18.6) above for agricultural land use, in this location where soil wetness is the dominant factor affecting the quality of the land in predominantly clayey soils, conditions are unlikely to be significantly affected by climate change. Therefore, the assessment of effects set out above is unlikely to be affected by climate change.

18.10.2 As set out in the Future Baseline section (Section 18.6) above, there are unlikely to be significant changes to the recreational baseline described in this chapter during the period up to 2038 as a result of climatic changes. The trend towards warmer, drier summers may result in greater participation in outdoor recreation but this is not anticipated to result in any changes to the assessment of effects on recreational resources set out in this chapter.

18.11. Cumulative Effects

Zone of Influence

18.11.1 The zone of influence (ZoI) for agricultural land use and recreation has been identified based on the spatial extent of likely effects. For this topic, the ZoI equates to the study area for the assessment of effects on these resources as described in Section 18.4 above, together with any resources that link to them, eg other lengths of the Sussex Border Path not directly affected by the Project.

Screening of Other Developments and Plans

18.11.2 The Cumulative Effect Assessment (CEA) (see Chapter 19 Cumulative Effects and Inter-relationships) takes into account the impact associated with the Project together with other developments and plans. The projects and plans selected as relevant to the CEA presented within this chapter are based upon the results of a screening exercise undertaken as part of the 'CEA short list' of developments (see Appendix 19.4.1). Each development on the CEA long list has been considered on a case by case basis for scoping in or out of this chapter's assessment based upon data confidence, effect-receptor pathways and the spatial/temporal scales involved.

18.11.3 In undertaking the CEA for the Project, it is important to bear in mind that the likelihood of other developments and plans being constructed varies depending on how far along the planning process they are. For example, relevant developments and plans that are already under construction are likely to contribute to a cumulative impact with the Project (providing impact or spatial pathways exist), whereas developments and plans not yet approved or not yet submitted are less certain to contribute to such an impact, as some may not achieve approval or may not ultimately be built due to other factors. For this reason, all relevant development and plans considered cumulatively alongside the Project have been allocated into 'Tiers', reflecting their current stage within the planning and development process. Appropriate weight is therefore given to each Tier in the decision-making process when considering the potential cumulative impact associated with the Project (eg it may be considered that greater weight can be placed on the Tier 1 assessment relative to Tier 2). Further details of the screening process for the inclusion of

other developments and plans in the short list and a description of the Tiers is provided in Chapter 19: Cumulative Effects and Inter-relationships.

18.11.4 The specific developments scoped into the CEA for agricultural land use and recreation and the Tiers into which they have been allocated, are outlined in Table 18.11.1. The developments included as operational in this assessment have been commissioned since the baseline studies for this Project were undertaken and as such were excluded from the baseline assessment. Full details of each of the developments is provided in Appendix 19.4.1.

Table 18.11.1: List of Other Developments and Plans Considered within CEA

Description of Development/Plan	Planning Phase	Distance from the Project (km)	Date of Construction (if applicable)	Overlap with the Project?
Tier 1				
Crawley North East Residential: CR 2016/0858/ARM	Phase 3	1.6	2019-2022	No
Crawley North East Residential: CR 2016/0083/ARM	Phase 2c	2.1	2019-2022	No
Crawley North East Residential: CR 2016/0962/ARM	Phase 3b	2.2	2018-2022	No
Crawley North East: CR 2016/0780/ARM	Not known	2.2	2017-2022	No
Crawley CR/2018/0894/OUT	Not known	1.3	2020 – 2022	No
Reigate and Banstead mixed use development (1510 dwellings) 04/02120/OUT	Not known	5.0	2014 - 2028	Yes
Mid Sussex District Council mixed development: 13/04127/OUTES	Not known	2.7	2016-2022	No
Horsham District Council EIA/20/004 West of Ifield	Not Known	1.5	Not yet known	Not yet known
Tier 3				
Forge Wood	2A, 1A, 1C, 3A	1.6	Not yet known	Not yet known
Horley Business Park: Policy HOR9 of the adopted Reigate & Banstead Development Management Plan 2018-2027	Not yet known	0.4	Not yet known	Not yet known
Crawley Borough Council – Land east of Balcombe Road – “Gatwick Green”	Not yet known	<0.1	Not yet Known	No
Tandridge District Council Local Plan:2033 Draft Policy HSGO1 Land at Plough Road and Redehall Road, Smallfield	Not yet known	3.6	Not yet known	No

Description of Development/Plan	Planning Phase	Distance from the Project (km)	Date of Construction (if applicable)	Overlap with the Project?
Tandridge District Council Local Plan:2033 Draft Policy HSGO3 Land at Plough Road, Smallfield	Not yet known	4.0	Not yet known	No
Future Mole Valley Draft Local Plan Site Allocation SA42 Land West of Reigate Road, Hookwood	Not yet known	0.3	Not yet known	No

Cumulative Effects Assessment

18.11.5 A description of the significance of cumulative effects upon agricultural land use and recreational receptors arising from each identified impact is given below.

Initial Construction Phase: 2024-2029

Agricultural Land Use

18.11.6 The Tier 1 sites to the North East of Crawley have been previously surveyed in detail by Defra and the results of the survey work (Appendix 18.6.1) identify that the land comprises predominantly lower quality Subgrade 3b land, similar to the areas of land affected by this Project. The Tier 1 residential site in Horsham District comprises approximately 100 hectares of land which has also been classified by Defra to comprise Subgrade 3b land, whilst the Tier 1 sites in Mid-Sussex and Reigate and Banstead comprised a mixture of mainly Subgrade 3b with areas of Subgrade 3a land.

18.11.7 The Tier 3 sites at Horley Business Park and Forge Wood, have also been subject to detailed Defra survey (Appendix 18.6.1) and comprise Subgrade 3b land. There is no ALC survey data for the remaining Tier 3 sites. The provisional ALC mapping shows the proposed housing allocations at Smallfield to comprise lower quality Grade 4 land, whilst the sites to the east of Balcombe Road and at Hookwood are shown to comprise Grade 3 land.

18.11.8 The quality of the land affected by this Project comprises lower quality Subgrade 3b land and therefore would not contribute to any cumulative loss of the best and most versatile Grades 1, 2 or Subgrade 3a land. Therefore, the Project is not anticipated to contribute to any significant cumulative effect.

18.11.9 Whilst the Tier 1 and Tier 3 developments would affect areas of agricultural grassland and limited areas of arable cropping to support mixed farming enterprises, it is not considered that these losses together with those limited areas of grassland affected by the Project would affect agricultural productivity in the local area. Therefore, no significant cumulative effects are considered likely.

Recreation

18.11.10 The proposed development of the Horley Business Park, located on land to the west of Balcombe Road, is set out in Policy HOR9 ‘Horley Strategic Business Park’ of the adopted Reigate and Banstead Development Management Plan 2018-2027. Under this policy the site is allocated for a strategic business park of predominantly offices; a complementary range of commercial, retail

and leisure facilities to serve and facilitate the main business use of the site; and at least five hectares of new high quality public open space, including parkland and outdoor sports facilities. Currently there are no details in terms of the timing of this development.

18.11.11 The Horley Business Park development will be subject to a number of requirements and considerations including:

- the retention or re-routing of public footpath 362a (Sussex Border Path) across the site to maintain a pedestrian link from Balcombe Road to the footbridge across the railway;
- upgrading and extension of pedestrian/cycle routes from the Business Park to Horley town centre and Gatwick Airport station; and
- provision and delivery of the public open space area.

18.11.12 Taking these policy requirements into account it is not anticipated that there would be any significant cumulative effects on the Sussex Border Path.

2030-2038

18.11.13 No further cumulative effects, other than those set out above, have been identified.

18.12. Inter-Related Effects

18.12.1 The assessment of effects on recreational resources set out in this chapter does not include any effects on the amenity of those resources as a result of changes to the visual and acoustic environments at either the construction or operation stages of the project. These are assessed, where relevant, in Chapter 8: Landscape and Visual Resources and 14: Noise and Vibration. A commentary on such effects will be included in the Agricultural Land Use and Recreation chapter of the ES.

18.13. Summary

Agricultural Land Use

Initial Construction Phase 2024-2029

18.13.1 During this phase of the Project there would be temporary agricultural land take associated with the start of construction phase for the improvements to the South terminal roundabout. This would affect an area of land immediately to the north of the existing South Terminal roundabout.

18.13.2 Within this area there would be a temporary loss of approximately 3.3 hectares of lower quality Subgrade 3b land. The significance of this long term temporary loss of this low quality agricultural land is assessed to be **moderate adverse** which is not considered to be significant.

18.13.3 Also associated with these temporary works at South Terminal roundabout, there would also be temporary disruption to a single holding which is let on a short term arrangement for horse grazing and hay production. The long term temporary effect of the loss of this single holding is assessed to be **minor adverse** significance

18.13.4 During this phase there would be permanent land take of approximately 13.2 hectares of agricultural land during this period associated with the development of surface parking on Pentagon Field, the provision of the flood compensation area in Museum Field and land required in connection with South Terminal and Longbridge Roundabout highways improvements. The

detailed ALC survey of these areas has shown them to comprise entirely lower quality Subgrade 3b land. The significance of this permanent loss of agricultural land quality is therefore assessed to be **moderate adverse**. Taking into account the amount and quality of the land affected, this is not considered to be a significant loss.

18.13.5 There would also be permanent loss of agricultural land from seven land holdings during this stage. These losses would have effects on three holdings where land is being used for agricultural production, but these enterprises would still be able to continue to operate.

18.13.6 The overall significance of effect arising from the permanent loss of these areas of agricultural grassland from these holdings is therefore assessed to be of **minor adverse** significance.

2030-2038

18.13.7 During this phase, there would no further effects on agricultural land and farm holdings beyond those identified for the 2024 - 2029 period.

Design Year:- 2038

18.13.8 No further effects on agricultural land use resources are anticipated as a result of the operation of the Project in the Design Year 2038.

Recreation

Initial Construction Phase 2024-2029

18.13.9 During the initial construction phase (2024-2029), there is the potential for disruption to access along the Sussex Border Path and public footpaths 367, 367Sy and 368 as a result of the commencement of the new grade separated junction to serve the South Terminal. It is proposed to fence and maintain the Sussex Border Path along its current alignment and, if necessary, temporarily divert the northern part of public footpath 367Sy that falls within the construction compound and that section that currently runs to the south of the M23 Spur. In addition, it is proposed that a number of public access improvements would be implemented to provide health and well-being benefits to the local community and the public generally, including the provision of new circular recreational route around the flood compensation area to the east of Museum Field, with a link to the existing alignment of the Sussex Border Path.

18.13.10 There is also the potential for the disruption to the existing public footpath that runs along the boundary of the Pentagon Field during the construction activities associated with the new surface car parking. It is proposed that this route is maintained along its existing alignment outside the perimeter fencing on the construction site for the safety of pedestrians.

18.13.11 Taking all these factors into account, the temporary effect on public rights of way during construction is assessed to be of **minor adverse** significance, and the overall effect on recreational routes and facilities during operation is assessed to be of permanent **minor beneficial** significance.

18.13.12 The improvement works associated with the proposed new grade separated junction to serve the North Terminal may encroach into the southern fringe of Riverside Garden Park. This would result in permanent loss of approximately 0.75 hectares of public open space within these areas and would impact on a section of the Sussex Border Path to the south of the A23. There would be no change to the alignment of NCR21 within the south eastern corner of Riverside Garden Park

and under the existing A23 during the construction works. However, there is the potential for some changes to the amenity of the route in this location.

18.13.13 To mitigate for these impacts the following measures have been incorporated into the Project design.

- New areas of public open space would be created totalling a minimum of 0.75 hectares or equivalent to the area of public open space lost as a result of the Project.
- A commitment would be given towards improvements/enhancements within Riverside Garden Park.
- A permanent on-airport diversion for the affected section of the Sussex Border Path which would be put in place prior to the commencement of construction works.
- Provision of a pedestrian link between the footway on the northern side of the A23 footway near the Longbridge Roundabout into Riverside Garden Park.
- Provision of an additional pedestrian route linking Riverside Garden Park with the Sussex Border Path to the north of the A23.

18.13.14 Taking these factors into account, the effect on the areas of public open space in Riverside Garden Park, is assessed to be of long term **moderate adverse** significance and significant in terms of the EIA regulations; and the effect on the Sussex Border Path is assessed to be of permanent **minor beneficial** significance.

2030-2032

18.13.15 The North and South Terminal junction improvements which would commence towards the end of the initial construction phase, are anticipated to be completed by 2032. Works to the Longbridge Roundabout are anticipated to take place between 2030 and 2032. These may impact approximately 0.1 hectares of land on the southern area of public open space (St Bartholomew's Church and the former Horley Anderson Centre and Playing Fields) to the north of the A23 and east of the River Mole.

18.13.16 To mitigate for these impacts the following measures have been incorporated into the Project design, in addition to those identified above.

- New areas of public open space would be created totalling a minimum of approximately 0.1 hectares (or an area equivalent to the total loss of public open space), with links to the existing area of Riverside Garden Park, St Bartholomew's Church and the former Horley Anderson Centre and Playing Fields, and the residential areas of Horley to the north and east.

18.13.17 Taking these factors into account, the effect on these areas of public open space is assessed to be of long term **minor adverse** significance.

2033-2038

18.13.18 No further effects on recreational resources are anticipated as a result of the ongoing construction and operation of the project in the period 2033-2038.

Design Year 2038

18.13.19 No further effects on recreational resources are anticipated as a result of the operation of the project in Design Year 2038.

Next Steps

18.13.20 Following the confirmation of the surface access solutions in relation to the new grade separated junction to serve the North Terminal, the package of mitigation measures to be incorporated into the Project will be developed and informed by ongoing consultation with the relevant local authorities and other stakeholders.

Table 18.13.1: Summary of Effects

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
Construction Phase 2024-2029							
Agricultural Land Quality	Medium	Loss of agricultural land required permanently for Project	Permanent	Medium	Moderate Adverse	Not Significant	Not considered to be significant, as no best and most versatile land resource (Grades 1, 2 or 3a land) is affected.
Agricultural Land Quality	Medium	Loss of agricultural land required temporarily for Project	Long term temporary	Medium	Moderate Adverse	Not Significant	Not considered to be significant in terms of the EIA Regulations, as no best and most versatile land resource (Grades 1, 2 or 3a land) is affected.
Farm Holdings	Medium	Loss of land from farm holdings required permanently for Project	Permanent	Low	Minor Adverse	Not Significant	
Farm Holdings	Medium	Loss of land from farm holdings required temporarily for Project	Long term temporary	Low	Minor Adverse	Not Significant	
Public rights of way & Sussex Border Path	Medium	Temporary diversion or disruption	Medium term	Low	Minor Adverse	Not Significant	

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
Provision of new route (Museum Field)	Medium	Permanent provision	Permanent	Low	Minor Beneficial	Not Significant	
Riverside Garden Park	Medium	Loss of approx. 0.75 hectares of public open space and provision of replacement land	Long Term	Medium	Moderate Adverse	Significant	
2030-2032							
Agricultural Land Quality	N/A	No additional effects	N/A	N/A	N/A	N/A	
Farm Holdings	N/A	No additional effects	N/A	N/A	N/A	N/A	
Public rights of way & Sussex Border Path	Medium	Temporary diversion or disruption	Medium term	Low	Minor Adverse	Not Significant	
Public open space at St Bartholomew's Church, Former Horley Anderson Centre & Playing Fields	Medium	Loss of approx. 0.1 hectares of public open space and provision of replacement land	Long term	Low	Minor Adverse	Not significant	

Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Significant / not significant	Notes
2033-2038							
Agricultural land quality	Medium	Restoration of land temporarily affected by use as compounds	Permanent	No change	No change	Not significant	No change compared to baseline conditions (ie reversal of previous temporary adverse effect)
Farm Holdings	Medium			No change	No change	Not significant	
Design Year: 2038							
No further effects							

18.14. References

Legislation

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18.15. Glossary

Term	Description
ALC	Agricultural Land Classification
BGS	British Geological Survey
BMV	Best and Most Versatile
CEA	Cumulative Effects Assessment
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges
EIA	Environmental Impact Assessment
ES	Environmental Statement
GAL	Gatwick Airport Limited
MAFF	Ministry of Agriculture, Fisheries and Food
NCR	National Cycle Route
NPPF	National Planning Policy Framework
NPPG	National Planning Practice Guidance
NPS	National Policy Statement
PEIR	Preliminary Environmental Information Report
ZoI	Zone of Influence

Preliminary Environmental Information Report
Chapter 19: Cumulative Effects and Inter-relationships

September 2021

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19 Cumulative Effects and Inter-relationships

19.1. Introduction

19.1.1 This chapter of the Preliminary Environmental Information Report (PEIR) presents the findings of the Environmental Impact Assessment (EIA) work undertaken to date concerning the potential effects of the proposal to make best use of Gatwick's existing runways (referred to within this report as 'the Project') on cumulative effects and inter-relationships.

19.1.2 This chapter considers the effects arising from the Project that may occur at the same time as effects from other developments on environmental receptors (cumulative effects), as well as the combined effects of the environmental topics covered in Chapters 7 to 18 of this PEIR on single receptors or receptor groups (inter-relationships).

19.1.3 The Cumulative Effects Assessment (CEA) element of this chapter considers effects on environmental receptors from two or more developments which could occur at the same time and which could result in greater effects than if the Project occurred on its own. The inter-related effects assessment considers effects on receptors or receptor groups, such as local residents, users of local rights of way or services, which may be affected by different environmental effects generated by the Project only. These effects could occur simultaneously or concurrently and may result in a greater effect than when considered on a topic by topic basis. This assessment therefore includes consideration of particular locations where several effects, for example noise, air quality and visual change, may all occur at the same time or one after another. Further information on the methodology can be found at Section 19.4 of this Chapter.

19.1.4 In particular, this PEIR chapter considers:

- the effects of one or more other developments alongside the effects from the Project on a single receptor;
- the effects of environmental topics over the lifetime of the Project including the construction and operation phases; and
- the receptor-led effects which result as a combination of multiple environmental effects on a single receptor or receptor groups.

19.1.5 This chapter is accompanied by Appendix 19.4.1 and Figures 19.4.1, 19.4.2, 19.4.3, 19.4.4, 19.9.1 and 19.9.2.

19.1.6 The PEIR will inform pre-application consultation. Following consultation, comments on the PEIR will be reviewed and taken into account in preparation of the Environmental Statement (ES) that will accompany the application to the Planning Inspectorate for development consent.

19.2. Legislation and Policy

Legislation

19.2.1 The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (as amended) (hereafter referred to as 'the EIA Regulations') require the EIA process to consider cumulative and inter-related effects. Cumulative effects result from multiple actions on receptors and

resources over time and are generally additive or interactive (synergistic) in nature. Cumulative effects can also result from:

'Impacts that result from incremental changes caused by other past, present or reasonably foreseeable actions together with the project.' (European Commission, 1999).

19.2.2 It is good practice to consider the inter-relationships between topics that may lead to environmental effects. For example, the separate impacts of noise and habitat loss may have an effect upon a single ecological receptor.

19.2.3 The EIA Regulations state in Schedule 4(5) that an assessment should provide a description of the likely significant effects, including cumulative effects, that could occur as a result of the Project in combination with other developments:

'(e) the cumulation of effects with other existing and/or approved projects, taking account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources;

…

The description of the likely significant effects on the factors specified in regulation 5(2) should cover the direct effects and any indirect, secondary, cumulative, transboundary…effects of the development.'

19.2.4 The EIA Regulations (Regulation 5(2)(e)) also require that the EIA process should identify, describe and assess the significant effects in relation to:

'(e) the interaction between the factors referred to in sub-paragraphs (a) to (d) [population and human health, biodiversity, land, soil, water, air, climate, material assets, cultural heritage and the landscape.]'

Planning Policy Context

National Policy Statements

19.2.5 As set out in Chapter 2: Planning Policy Context, the Airports National Policy Statement (NPS) (Department for Transport, 2018), although primarily provided in relation to a new runway at Heathrow Airport, remains a relevant consideration for other applications for airport infrastructure in London and the south east of England.

19.2.6 The NPS for National Networks (Department for Transport (DfT), 2015[1]) sets out the need for development of road, rail and strategic rail freight interchange projects on the national networks and the policy against which decisions on major road and rail projects will be made. This has been taken into account in relation to the highways improvements proposed as part of the Project.

[1] It is noted that the Transport Decarbonisation Plan published by DfT on 14 July 2021 announced DfT's intention to review the NPS for National Networks in due course once demand patterns post-pandemic become clearer. It is understood DfT intend to commence the review by the end of 2021 and complete it by Spring 2023. In the interim and whilst the review is undertaken, DfT have confirmed the NPS for National Networks remains relevant government policy and has full force and effect for the purposes of the Planning Act 2008.

19.2.7 Table 19.2.1 provides a summary of the relevant requirements of these NPSs in relation to the assessment of cumulative effects and inter-relationships and how these are addressed within the PEIR.

Table 19.2.1: Summary of NPS Information Relevant to this Chapter

Summary of NPS Requirement	How and Where Considered in the PEIR
Airports NPS and NPS for National Networks	
In considering any proposed development the examining authority will take into account its potential adverse impacts including any longer term and cumulative adverse impacts as well as measures to avoid, reduce or compensate for any adverse impacts (paragraphs 4.4 in Airports NPS and 4.3 in NPS for National Networks). Any environmental statement should describe any cumulative effects (paragraphs 5.176 in Airports NPS and 5.223 in NPS for National Networks).	The cumulative effects of the Project with other developments are considered in Chapters 7 – 18 of this PEIR and summarised in this chapter.
When considering significant cumulative effects, any environmental statement should provide information on how the effects of an applicant's proposal would combine and interact with the effects of other development (including projects for which consent has been granted, as well as those already in existence if they are not part of the baseline) (paragraphs 4.13 in Airports NPS and 4.16 in NPS for National Networks).	The cumulative effects of the Project with other developments are considered in Chapters 7 – 18 of this PEIR and summarised in this chapter. Other developments, including those applications which have been granted but not yet implemented and those recently constructed and not forming part of the baseline, have been considered in the cumulative 'long list' (Appendix 19.4.1).
The Examining Authority should consider how significant cumulative effects, and the interrelationship between effects, might as a whole affect the environment, even though they may be acceptable when considered on an individual basis or with mitigation measures in place (paragraphs 4.15 in Airports NPS and 4.17 in NPS for National Networks).	The cumulative and inter-related effects are considered and presented within this chapter of the PEIR.

National Planning Policy Framework

19.2.8 The National Planning Policy Framework (NPPF) (Ministry of Housing, Communities and Local Government, 2021) sets out the planning policies for England. In relation to various specific environmental topics, the NPPF states that the consenting authority should take cumulative effects into account when making a decision.

19.2.9 The National Planning Practice Guidance (NPPG) (Ministry of Housing, Communities and Local Government, 2019 supports the NPPF and provides guidance across a range of topic areas. The NPPG states that:

'Each application (or request for a screening opinion) should be considered on its own merits. There are occasions, however, when other existing or approved development may be relevant in determining whether significant effects are likely as a consequence of a proposed development. The local planning authorities should always have regard to the possible cumulative effects arising from any existing or approved development.' (Paragraph 024, updated May 2020).

19.2.10 For individual environmental topics the NPPF reiterates the need to consider cumulative and inter-related effects.

19.3. Consultation and Engagement

19.3.1 In September 2019, Gatwick Airport Limited (GAL) submitted a Scoping Report to the Planning Inspectorate, which described the scope and methodology for the technical studies being undertaken to provide an assessment of any likely significant effects and, where necessary, to determine suitable mitigation measures for the construction and operational phases of the Project. It also described those topics or sub-topics which are proposed to be scoped out of the EIA process and provided justification as to why the Project would not have the potential to give rise to significant environmental effects in these areas.

19.3.2 Following consultation with the statutory bodies, the Planning Inspectorate (on behalf of the Secretary of State) provided a Scoping Opinion on the 11 October 2019.

19.3.3 Key issues raised during the scoping process specific to cumulative effects and inter-relationships are listed in Table 19.3.1, together with details of how these issues have been addressed within the PEIR.

Table 19.3.1: Summary of Scoping Responses

Details	How/where addressed in PEIR
The Inspectorate recognises that a number of the ES aspect chapter study areas are yet to be fully defined for the purposes of the assessment (and by extension, the cumulative assessment). The ES should specifically justify the definition of each of these ZoIs (Zone of Influence), particularly where subjective judgements are made based on local knowledge (which should be fully explained in each case). For example, the ZoI for European designations will need to be established in light of transport and air quality modelling work which may require it to be extended beyond the 20 km currently stated.	The ZoIs used in the CEA are based on the study areas presented within each topic chapter. The justification for the selection of each study area is outlined in Chapters 7 to 18 of this PEIR.
The implications of Heathrow's expansion should be fully identified and explored in terms of potential for significant cumulative effects across relevant aspect chapters for both construction and operation. Although the project at Heathrow is outside of the 15 km ZoI, the Inspectorate considers that an increase in night flights associated with the Proposed Development (combined with Heathrow expansion and any airspace change) could impact residential amenity (and other aspects) of communities and other receptors adjacent to Gatwick Airport. The	The expansion of Heathrow has been included in the short list of other developments as a Tier 2 development. The cumulative effects with Heathrow have been assessed (where relevant) as part of the cumulative assessments in the PEIR

Details	How/where addressed in PEIR
Inspectorate also expects there will be a degree of overlap in the strategic level transport modelling for both projects which will also need to be addressed within the ES (including construction Heavy Goods Vehicles (HGVs)).	based on the information available to date.
Where new 'other development' comes forward following the Applicant's stated assessment cut-off date (3 months prior to submission), the Examining Authority may request additional information during the Examination in relation to effects arising from such development. The Applicant should be aware of the potential need to conduct further assessments and provide more information.	The long list of other developments will be reviewed up until three months prior to submission of the application for development consent. Any applications for other developments submitted after this cut off will be considered as required by the Planning Inspectorate post submission.
Crawley Borough Council and West Sussex County Council have highlighted the need for the Homes England "West of Ifield" development (10,000 homes) to be considered as part of the cumulative assessment, as a receptor of and a contributor towards potential cumulative effects of the Proposed Development.	The 'West of Ifield' development is included in the short list of other developments considered in this assessment (Appendix 19.4.1).
Surrey County Council highlight a number of recently permitted minerals developments and allocated minerals sites (which would qualify as 'major development' against the Applicant's criteria). The Applicant should consider inclusion of these developments in the 'long list' of cumulative schemes or otherwise justify their exclusion.	Allocated mineral sites and permitted mineral developments for both Surrey and Sussex have been included in the long list.
The ES should consider the potential for cumulative effects of the Horley Employment Park as well as any influence of the Employment Park scheme on the design of the Proposed Development, with particular regard to assessment assumptions around: ▪ proposed end uses of the site (in the absence of a masterplan for the Employment Park); and ▪ construction phasing (given that construction is estimated to take place over a twenty-year period).	The Horley Employment Park is included in the long list of other developments considered in this assessment (Appendix 19.4.1).

19.3.4 Key issues raised during consultation and engagement with interested parties specific to the CEA and assessment of inter-relationships are listed in Table 19.3.2, together with details of how these issues have been addressed within the PEIR.

Table 19.3.2: Summary of Consultation

Consultee	Date	Details	How/where addressed in PEIR
Local Authority Working Groups	August 2019	Overview of approach set out. Authorities identified some potential considerations for cumulative effects, but no detailed comments made.	Long list of cumulative developments issued with scoping report – local authorities to respond through consultation responses.

19.4. Assessment Methodology

Relevant Guidance

19.4.1 A range of guidance is available on CEA and the assessment of inter-relationships but at present there is no single, agreed industry standard method. The following guidance documents have been taken into consideration for the assessment presented in this chapter.

Design Manual for Roads and Bridges

19.4.2 The Design Manual for Roads and Bridges (DMRB) provides guidance on cumulative effects and inter-relationships. Although directly relevant to the assessment of road schemes/new highways infrastructure, it is widely recognised as useful in the context of other types of major infrastructure projects. The DMRB (LA 104) (Highways England *et al.,* 2020) provides useful definitions and assessment methodologies for inter-related effects, and therefore this document has been taken into consideration in this assessment. The DMRB defines the following two types of effects:

- Type 1 effects: A single project (eg numerous different effects impacting a single receptor) and
- Type 2 effects: Different projects (together with the project being assessed).

19.4.3 The guidance sets out the following factors to be considered in the assessment of such effects.

- Which receptors/resources are affected?
- How will the activity or activities affect the condition of the receptor/resource?
- What are the probabilities of such effects occurring?
- What ability does the receptor/resource have to absorb further effects before changes become irreversible?

Planning Inspectorate Advice Notes

19.4.4 Planning Inspectorate Advice Note Seventeen (Planning Inspectorate, 2019) provides a clear and systematic approach to CEA which forms the basis of the CEA for the Project. The approach consists of a four stage process which is further described below.

19.4.5 In relation to the assessment of inter-relationships, the Planning Inspectorate Rochdale Envelope Advice Note Nine (Planning Inspectorate, 2018), states that the assessment should:

'…ensure that the assessment of the worst case scenario(s) addresses impacts which may not be significant on their own but could become significant when they inter-relate

with other impacts alone or cumulatively with impacts from other development (including those identified in other aspect assessments).'

European Commission

19.4.6 The Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions published by the European Commission (1999) provide a useful explanation of the types of cumulative and inter-related effects that can occur as a result of development. The report emphasises the need for a thorough scoping process so that the CEA and inter-relationships assessment focuses on specific effects which have not already been assessed in other areas. It notes the need to identify the temporal and geographical overlap of effects as well as future and historical effects.

Study Area

19.4.7 The study area, or Zone of Influence (ZoI), for the CEA and assessment of inter-relationships is based primarily on the study areas for each topic area for the Project as well as the study areas for each of the other developments. Further information on the ZoIs used in this assessment is presented below.

Methodology

Cumulative Effects Assessment

19.4.8 As mentioned above, the CEA methodology is primarily based on the process set out in the Planning Inspectorate Advice Note Seventeen (Planning Inspectorate, 2019) which consists of a four stage process. The four stage process and how this has been progressed is outlined in Table 19.4.1.

Table 19.4.1: Summary of the Four Stage Approach to CEA

CEA Stage	Activity
Stage 1	Identify a long list of 'other developments' using the tiered approach (see below). In order to do this the Zone of Influence (ZoI) for each topic area has been identified which forms the basis of the search area. The developments included in the long list have been included along with important information and the assigned tier.
Stage 2	From the long-list, develop a short list of 'other developments' which are considered within the CEA. Inclusion/exclusion criteria outlined below used to define the short list. The short list has been consulted upon with statutory and non-statutory consultees during the EIA process.
Stage 3	A desk study has been undertaken to gather the appropriate environmental information (if available) for the identified 'other developments' in the short list.
Stage 4	An assessment of the likely cumulative effects. Mitigation measures are identified (where appropriate) where an adverse cumulative effect is identified. The apportionment of effect between the Project and the 'other developments' is considered, eg whether the contribution to the effect is demonstrably related to one development or whether there is an equal contribution from either development.

Stage 1

19.4.9 The ZoI for each topic area has been identified primarily based on the extent of likely effects. Each topic area has used topic-specific guidance along with professional judgement and knowledge of the local area to define the geographical ZoI. The identified ZoIs are presented in Table 19.4.2 below and shown on Figure 19.4.1.

Table 19.4.2: Zone of Influence for Cumulative Effects Assessment

Topic	Zone of Influence
Historic Environment	Built heritage: 3 km. Buried archaeology: 1 km. Setting of heritage assets: overflying aircraft below 7,000 feet within noise preferential route (NPR).
Landscape, Townscape and Visual Resources	Landscape, townscape and visual receptors: 5 km and within ZTV (zone of theoretical visibility). Landscape tranquillity, visual receptors (overhead aircraft): overflying aircraft below 7,000 feet within the NPR.
Ecology and Nature Conservation	Nationally and locally designated sites: 5 km. European designated sites: 20 km (may be extended for Special Areas of Conservation (SAC) designated for bats should relevant species be identified on the Project site). Additional internationally, nationally and locally designated sites within 200 metres of significant surface access routes. Protected species records: 2 km (and 10 km for bats). General surveys: within the Project site boundary. Bats surveys: woodland in the surrounding landscape if they support bat roosts/ would help in the understanding of bat use of the Project site. Otter surveys: 500 metres up and down stream of major water resources entering the Project site.
Hydrogeology, Geology and Ground Conditions	500 metres.
Water Environment	General: 2 km (may be extended if a hydrological pathway is identified). Geomorphology: the catchments and channels of the receptors that could be directly impacted by the Project (River Mole upstream of Horley, River Mole (Horley to Hersham), Tilgate Brook and Gatwick Stream at Crawley, and Burstow Stream). Flood risk: areas within hydraulic and morphological connectivity of receptors. Wastewater: Gatwick's supporting infrastructure.
Traffic and Transport	Road network: affected road network modelled to result in a greater than 30% increase of vehicles (or the number of heavy good vehicles (HGVs) to increase by 30%) or greater than 10% in a sensitive area (or HGVs increase by 10% in a sensitive area). Rail network: affected rail network and PLANET South (railway) model.
Air Quality	Construction dust emissions: 350 metres from construction activities or 50 metres for ecological effects.

Topic	Zone of Influence
	Trackout: 500 metres along construction traffic routes from site entrance(s). Construction road traffic emissions: the extent of the road traffic model. Operation Emissions: ADMS- Airport Dispersion modelling software (11 km by 10 km centred on the airport).
Noise and Vibration	ZoI includes all receptors that may experience potential adverse impacts. For example, for some air noise metrics, this area extends more than 20 km from the airport and overflights are considered beyond this, whereas for ground noise, the nearest receptors around the airport have been assessed, as at greater distances, the impacts will be lower.
Climate Change and Carbon	In-combination Climate Change Impact: dependent on related topic, eg flood risk. Climate Change Resilience: the Project itself. Greenhouse Gases (GHG): GHG emissions from the Project to the global climate in context of UK national GHG targets.
Socio-Economic Effects	Local study area includes the surrounding six local authorities (Crawley, Horsham, Mid Sussex, Mole Valley, Reigate and Banstead, and Tandridge). Labour market area extends wider to also include Croydon, Wealden, Lewes, Brighton and Hove, Mid Sussex, Eastbourne, Adur and Worthing, and Arun, as well as those indicated above. 'Five authorities' area used as the widest extent to include the County areas of East Sussex, West Sussex, Kent and Surrey, plus the unitary authority of Brighton and Hove.
Health and Wellbeing	For initial analysis, data collection has focused on the local authority districts of Crawley, Reigate and Banstead, Tandridge, Mid Sussex, Horsham and Mole Valley, using regional (South East) and national (England) averages as comparators. Health-specific data will be tailored in geographic scope to the varying health determinants being assessed, and the requirement of the individual health assessment protocols being applied.
Agricultural Land Use and Recreation	Agriculture: Agricultural land within the Project site and the wider land holdings. Recreation: The Project site, any resources that lie immediately adjacent to the Project site and any links to it.

19.4.10 The overarching criteria used in the desk study for long-listing potentially relevant 'other developments' are:

- other developments with the potential for overlap with the Project in terms of impacts on sensitive receptors; or
- other developments that introduce new sensitive receptors that could be impacted by the Project, where existing receptors assessed are not adequately representative of effects.

19.4.11 These overarching criteria generally exclude minor household applications and business applications (such as extensions or changes of use), of which there are very large numbers at any given time and which are not likely to result in significant cumulative effects. Nevertheless, minor applications have been reviewed within 1 km of the Project site and a judgement taken as

to whether they could result in any significant cumulative effects. Any minor applications that could result in significant cumulative effects have been included in the assessment.

19.4.12 Applications that introduce new receptors have been identified and considered within each topic chapter, where appropriate.

19.4.13 Table 19.4.3 provides a summary of the search criteria used to identify 'other developments' for the long list. Known 'other developments' located outside of the search radius have been considered on a case by case basis as to whether they are likely to result in cumulative effects. These have been included in the long list as appropriate.

Table 19.4.3: Search Criteria for Developments to be Included in the Long List

Development/plan		Search timescale	Search radius	Screening criteria			
				Housing unit (no)	Housing land (ha)	Non-residential (m^2)	Non-residential (ha)
Nationally Significant Infrastructure Projects		5 years previous from March 2021	15 km	Screened in			
Transport and Works Act Orders (TWAO)				Screened in			
Hybrid Bills				Screened in			
"Major applications" to LPA	Large Scale		8 km	200+	4+	10,000+	2+
	Small Scale			10-199	0.5 – 4	1,000 – 10,000	1-2
Other applications to LPA			1 km	Considered on a case by case basis.			
Local Development Plan allocations			8 km	Screened in with less weight given to emerging plans.			

19.4.14 The types of 'other development' considered in the CEA are set out in Table 19.4.4 (adapted from Table 2 of Planning Inspectorate Advice Note Seventeen). The key difficulties in any CEA relate to the level of detail available in relation to 'other developments' and the reliance that needs to be made on environmental assessment carried out by others. For those applications at earlier stages of development or those for which EIA has not been undertaken, professional judgement and knowledge of the study area have been employed to consider the receptors or resources that may be affected by the Project and the 'other developments' in question.

Table 19.4.4: 'Other Developments' for Inclusion in the CEA (Adapted from Planning Inspectorate, 2019)

Tier	Description	
Tier 1	Under construction (however, where projects are expected to be completed before construction of the Project and the effects of those projects are fully determined, effects arising from them should be considered as part of the baseline).	Decreasing level of detail likely to be available as you move down the tiers.
	Permitted application(s) but not yet implemented.	
	Submitted application(s) but not yet determined.	
Tier 2	Planning application(s) where a scoping report has been submitted.	
Tier 3	Projects on the planning register where a scoping report has not yet been submitted.	
	Sites identified in the relevant Local Development Plans (and emerging Local Development Plans – with appropriate weight being given as they move closer to adoption) recognising that much information on any relevant proposal will be limited.	
	Other plans and programmes (as appropriate) which set the framework for future development consent/approval, where such development is reasonably likely to come forward.	

19.4.15 The long list identified using the above method is presented in Appendix 19.4.1. Each development on the long list has been assigned a tier based on Table 19.4.4.

19.4.16 This list will be updated periodically during the EIA process, informed by consultation and modelling confirming the extent of study areas, and will be finalised approximately three months prior to the submission of the application for development consent.

Stage 2

19.4.17 The following criteria have been used in screening developments for inclusion in the short list. These criteria, however, are not exhaustive or wholly prescriptive: expert judgement by the EIA team has also been applied throughout the CEA process. The following developments have been included in the short list.

- EIA developments or those where an un-determined EIA screening or scoping request indicated the possibility of significant environmental effects was foreseen.
- 'Major developments', where identified as such on the planning register, or which have the potential to result in cumulative effects (based on professional judgement).
- Developments whose scale, nature or location suggests potential for particular cumulative effects - eg an industrial or combustion process as a source of air or water pollutant or noise emissions, a potential large traffic generator such as distribution warehouse or retail park, or a development in proximity to a designated site or other asset.
- Completed developments that may not be captured in baseline studies (eg due to very recent start of operation).
- Developments that introduce sensitive receptors for which the assessment of effects on existing sensitive receptors identified through baseline study and included in the assessment of a particular environmental impact would not be representative.

- All long listed Nationally Significant Infrastructure Projects, Transport and Works Act project and Hybrid Bill schemes.

19.4.18 The short listed developments are highlighted in green in Appendix 19.4.1 and summarised in Table 19.4.5. The locations of these developments are shown in Figures 19.4.2, 19.4.3 and 19.4.4. Developments not meeting these inclusion criteria and/or not considered to have potential for cumulative effects have been screened out of the short list.

Table 19.4.5: Summary of Short List of 'Other Developments' Identified for CEA

Reference Number	Application Number	Description	Distance from Project (km)
Tier 1			
2	CR/2016/0858/ARM	Forge Wood. Application for approval for reserved matters for Phase 3 Employment Building, car parking, internal access roads, footpaths, parking and circulation areas, hard and soft landscaping and other associated infrastructure and engineering works.	1.6
3	CR/2016/0083/ARM	Forge Wood. Application for approval of reserved matters for Phase 2c for the erection of 249 dwellings, car parking including garages, internal access roads, footpaths, parking and circulation area, hard and soft landscaping and other associated infrastructure and engineering works.	2.1
9	CR/2016/0962/ARM	Forge Wood. Application for approval of reserved matters for Phase 3b for 151 dwellings and associated works.	2.2
15	CR/2016/0114/ARM	Forge Wood. Approval of reserved matters for Phase 2d for the erection of 75 dwellings, car parking including garages, internal access roads, footpaths, parking and circulation area, hard and soft landscaping and other associated infrastructure and engineering works and noise.	2.1
17	CR/2016/0780/ARM	Forge Wood. Application for approval of reserved matters for Phase 3a for 225 dwellings and associated works.	2.2
46	CR/2018/0544/OUT	Application for up to 150 residential units; new site access from Birch Lea with enhanced access from Kenmara Court, demolition of the existing Oakwood Football Club.	2.1
48	CR/2017/0810/FUL	Application for the temporary use (for a period of 5 years) of the site as a Park and Ride car park, comprising 892 car parking spaces (814 long stay) and associated infrastructure.	1.2
155	CR/2018/0894/OUT	Outline application for up to 185 residential dwellings with associated vehicle and pedestrian access via steers lane, car parking, cycle storage and landscaping.	1.3

Reference Number	Application Number	Description	Distance from Project (km)
158	CR/2016/0997/FUL	Demolition of 3 existing office buildings and erection of a new b1(a) office building.	2.0
159	CR/2012/0134/OUT	Outline application for erection of a mixed use employment park to include use classes b1c, b2, b8 and a business hub accommodating a mix of uses, including b1a, b1c, b8, c1, a1, a3, a5 and car dealerships.	2.4
162	CR/2017/0997/OUT	Hybrid application for construction of a new town hall and offices, associated car parking, 182 residential units and commercial space.	3.3
52	04/02120/OUT	Comprehensive mixed use development to comprise housing (approx. 1510 dwellings), neighbourhood centre, primary school, recreation and open space uses, plus associated infrastructure and access roads linking the development to A23 and A217.	5.0
64	2019/548/EIA	Request for screening opinion for the proposed development of circa 360 residential units and a small amount of commercial development.	1.5
73	DC/17/2481	Outline planning application for the development of approximately 227 dwellings with the construction of a new access from Calvert Link, a pumping station and associated amenity space.	6.3
81	13/04127/OUTES	Outline planning application for up to 500 homes, a primary school and doctors surgery, up to 15,500 sqm employment floorspace, public open space, allotments, associated landscaping, infrastructure and pedestrian and cycle access.	2.7
102	CR/2014/0760/FUL	Crawley Local Plan 2030 (Adopted). Part of the Manor Royal Main Employment Area Site Allocation. Planning permission, subject to legal agreement, for erection of two office buildings, a four and a half storey decked car park, a single storey decked car park and surface car parking with landscaping and new access from private roads linking to Fleming Way and London Road.	1.5
103	CR/2015/0552/NCC (and subsequent reserved matters and non-material amendment applications)	Allocated in Crawley Local Plan 2030 (Adopted) known as Forge Wood. Erection of up to 1900 dwellings, 5000sq.m. of use class b1,b2 & b8 employment floorspace, 2500sq.m. of retail floorspace, a local centre/community centre (including a community hall), a new primary school, recreational open space, landscaping, the relocation of the 132kv overhead power line adjacent to the M23, infrastructure and means of access. CR/1998/0039/OUT	1.6

Reference Number	Application Number	Description	Distance from Project (km)
		permitted through appeal on 16/02/2011. A variation of condition application, CR/2015/0552/NCC, was approved in 2016 and did not change the quantum of development, the proposed land uses or for the most part the general disposition of those land uses within the site. There have since been a number of reserved matters applications for the phased stages of development (1A,1C,2A,3A) and non-material amendments made.	
281	CR/2019/0542/FUL	Demolition of existing nightclub and redevelopment of site providing 152 apartments, ground floor commercial/retail space (class A1, A3, A4, B1 and/or D2 uses) split between 2 to 4 units, new publicly accessible public realm (including pocket park), new publicly accessible electric vehicle charging hub, car club and associated works	4
283	CR/2015/0718/ARM	Allocation within Crawley Local Plan 2021-2037 (Regulation 19). Approval of Reserved Matters for Phase 2B for 169 dwellings and associated works pursuant to outline permission CR/2015/0552/NCC for a new mixed use neighbourhood	1.6
289	20/02515/SCREEN	Screening opinion for erection of a crematorium together with associated access, parking and landscaping. Screened as not EIA.	7.2
292	20/02017/S73	Part demolition of existing building, conversion of upper floors of existing building to residential with additional floor, connected 5 storey new build residential building. To provide total 43 apartments.	1.5
149	DC/10/1612	Housing/Mixed Development site allocated in the Horsham DC Planning Framework (Adopted 2015). Outline approval for the development of approximately 2500 dwellings, new access from A264 and a secondary access from A264, neighbourhood centre, comprising retail, community building with library facility, public house, primary care centre and care home, main pumping station, land for primary school and nursery, land for employment uses, new rail station, energy centre and associated amenity space. To be constructed in phases of which most are built out.	6.7
328	EIA/20/0004	EIA Scoping for West of Ifield - allocated site. The proposed development is on a site of 194 hectares in size with a minimum of 3,250 homes and up to 4,000 homes	1.5

Reference Number	Application Number	Description	Distance from Project (km)
		along with social infrastructure, green infrastructure and highway links.	
334	13/04127/OUTES	Outline planning application for up to 500 homes, a primary school and doctors surgery, up to 15,500sqm employment floorspace (B1c light industry/B8 storage and distribution), public open space, allotments, associated landscaping, infrastructure (including sub stations and pumping station) and pedestrian and cycle access	2.7
341	DM/20/4127	Outline application for an expansion of the existing commercial estate with up to 7,310 sq m of new commercial space. There is currently 3,243 sq m of existing commercial space, of which 2,530 sq m will be retained and 713 sq m of lower-quality, temporary buildings and portacabins removed.	7.3
387	CR/2018/0273/FUL	Gatwick Station. Proposed construction of new station concourse/airport entrance area, link bridges, platform canopies, back of house staff accommodation and associated improvement works.	0
Tier 2			
328	EIA/20/0004	EIA Scoping for West of Ifield - allocated site. EIA Scoping for West of Ifield - allocated site. The proposed development is on a site of 194 hectares in size with a minimum of 3,250 homes and up to 4,000 homes along with social infrastructure, green infrastructure and highway links.	1.5
385	TR020003 (PINS Reference)	Expansion of Heathrow Airport to enable at least 740,000 air traffic movements per annum and including a new runway to the north-west of the existing airport; supporting airfield, terminal and transport infrastructure; works to the M25, local roads and rivers; temporary construction works, mitigation works and other associated development.	40
Tier 3			
112	Tinsley Lane	Key Housing Site Allocation for 120 dwellings and community uses under Local Plan. Outline application CR/2018/0544/OUT for 150 units and community uses submitted in July 2018 appears to have been undetermined or withdrawn.	2.2

Reference Number	Application Number	Description	Distance from Project (km)
133	Land west of Balcombe Road, Horley Strategic Business Park	Horley Employment Park - Strategic Employment Site - 83ha with 200,000 sqm office space.	0
134	Land off the Close and Haroldslea Drive	Residential allocation, up to 40 new homes, 2.4 hectare site.	1.2
152	Land north of Rosemary Lane	Identified for a potential ca. 150 housing units, 5.12 hectare site.	1.4
153	Land east of Ifield Road	Identified for a potential ca. 150 housing units, 9 hectare site with 5 hectares developable.	1.4
356	Land adjacent to Desmond Anderson	Housing allocation for 150 dwellings	6.6
357	Land to the southeast of Heathy Farm, Balcombe Road	Housing allocation for 150 dwellings	4.1
359	Telford Place/ Haslett Avenue	Town Centre Key Opportunity Site - Housing allocation for 300 dwellings	5
361	Crawley College	Town Centre Key Opportunity Site - Housing allocation for 400 dwellings	4.7
368	Land east of Balcombe Road and South of the M23 Spur - 'Gatwick Green'	Allocated for an industrial-led Strategic Employment Location that will provide as a minimum 24.1ha new industrial land, predominantly for B8 storage and distribution use	2.5
145	Land at Plough Road and Redehall Road, Smallfield	160 residential units, 5 hectare site under Proposed Plan	3.6
146	Land North of Plough Road, Smallfield	120 residential units, 9.2 hectare site under Proposed Plan	4.0
264	Land West of Reigate Road, Hookwood Site Allocation Policy SA42	Site identified in the Reg 18 consultation draft local plan (Feb 2020 to March 2020) for 450 dwellings and two gypsy and travellers pitches	0.3
386	Gatwick Airport Sewage Treatment Works	Land within the airport available for extension to the Crawley Sewage Treatment Works if required.	0

Stage 3

19.4.19 A desk study search of the environmental information available for each of the 'other developments' listed in the short list has been undertaken. This included searching on Local Planning Authorities and the Planning Inspectorate websites. The information gathered has been used to identify the likely significant cumulative effects.

Stage 4

19.4.20 The CEA does not aim to assign significance levels (such as negligible, minor, moderate or major) for the identified effects. Instead the assessment is used to identify where there is the potential for cumulative effects to occur and to provide details of whether cumulative effects are likely to be significant or not. A statement is made as to whether the cumulative effect would be worse or better than the effects predicted for the Project alone, whether the cumulative effects have the potential to be more significant than the effects of the Project alone and, if so, whether this would be adverse or beneficial.

19.4.21 Each topic assessed as part of the EIA process has considered the 'other developments' from the short list which could result in significant effects. Each topic has based this selection on the location, nature and status of each development and provided a table justifying the inclusion of each development in their assessment. Chapters 7 to 18 provide an assessment on the likely significant cumulative effects. This chapter provides a summary of these assessments.

Inter-relationships

19.4.22 The study areas or ZoI for the assessment of inter-related effects have been informed by the study areas used in the topic specific assessments. The ZoI used in the assessment of inter-related effects is the same as those used in the CEA, outlined in Table 19.4.2.

19.4.23 The approach to assessing inter-related effects will also follow a four stage process, albeit different stages to the CEA, as summarised in Table 19.4.6 and discussed in the following paragraphs.

Table 19.4.6: Summary of the Approach for Assessment of Inter-related Effects

Stage	Description
1	Assessments undertaken for individual EIA topic areas within the ES.
2	Review of the likely receptor(s)/resource(s) affected by more than one impact through analysis of the assessment of effect sections undertaken for individual EIA topic areas.
3	Identification of potential combined effects on these receptor groups through review of the topic-specific assessments in the ES chapters.
4	Assessment undertaken on how individual effects may combine to create inter-related effects on each receptor group for 'Project lifetime effects' and 'receptor led effects'.

Stage 1: Topic-specific Assessments

19.4.24 The first stage of the assessment of inter-related effects has been presented in each of the individual topic chapters (Chapters 7 to 18 of this PEIR) and comprises the individual assessments of effects on receptors across the construction and operational phases of the Project.

Stage 2: Identification of Receptor Groups

19.4.25 Stage 2 involves a review of the assessments undertaken in the topic-specific chapters to identify 'receptor groups' requiring assessment within the inter-related effects assessment. The term 'receptor group' is used to highlight that the approach taken for the inter-related effects assessment does not assess every individual receptor assessed during the EIA process, but rather potentially sensitive groups of receptors. The receptor groups assessed can be broadly categorised as follows:

- landscape and visual resources: designated sites; landscape character; visual receptors (residents, users of public rights of way, other visual receptors);
- historic environment: buried archaeology; designated heritage assets; settings of heritage assets;
- land use and recreation: agricultural land; farm businesses; users of recreational facilities (eg Public Rights of Way (PRoW));
- socio-economics: employment levels; housing and other local services; tourism;
- ecology and nature conservation: ecologically designated sites; important habitat features; protected species;
- traffic and transport: road users; residents; pedestrians/cyclists; sensitive local uses (eg schools, hospitals, local facilities);
- noise and vibration: residents; users of other land uses (eg places of work);
- air quality: residents; places of public amenity/public attractions; places of work; schools/hospitals; species/habitats;
- health: residents in the local area;
- climate change: global climate;
- water environment: surface water bodies; flood risk (residents, other land uses); and
- geology and ground conditions: geologically designated sites; land/soils; groundwater (including aquifers and Source Protection Zones).

Stage 3: Identification of Potential Inter-related Effects on Receptor Groups

19.4.26 Consideration has been given to the potential for inter-related effects to arise for each of the identified receptor groups across the Project phases (ie Project lifetime effects) as well as the interaction of multiple effects on a receptor (ie receptor-led effects), as defined below.

- Project lifetime effects – assessment of the scope for effects that occur throughout more than one phase of the Project (construction and operation and maintenance) to interact to potentially create a more significant effect on a receptor than if assessed in isolation.
- Receptor-led effects – assessment of the scope for multiple effects to interact, spatially and temporally, to create inter-related effects on a receptor or receptor group. As an example, multiple effects on a given receptor, such as local residents, could include construction dust and noise, increased traffic and visual change which may interact to produce a greater effect on this receptor than when the effects are considered in isolation. Receptor-led effects might be short term, temporary, or incorporate longer term effects.

Stage 4: Assessment of the Inter-related Effects on Each Receptor

19.4.27 Individual effects on each of the receptor groups identified above have been considered. A descriptive assessment of the scope for these individual effects to interact to create a different or greater effect has then been undertaken. The assessment has been undertaken qualitatively

based on the information available at this stage of the Project. Professional judgement has been used to identify the likely inter-related effects that could occur at these receptor locations. The assessment does not assign significance levels but instead a statement has been made as to whether the inter-related effects would be worse or better than the effects considered alone, and if so, whether this would be adverse or beneficial.

19.4.28 Due to the preliminary nature of the assessment presented within this PEIR, a detailed assessment of the significance of the likely inter-related effects has not been undertaken. Instead, a discussion on the effects likely to arise within these receptor groups has been presented and consideration of whether the inter-related effects would be any greater than those considered in the PEIR. When an updated assessment is undertaken at the ES stage, a more descriptive assessment of inter-related effects will be undertaken.

19.5. Assumptions and Limitations of the Assessment

Cumualtive Effects Assessment

19.5.1 The assessment of cumulative effects is based on the short listed developments and publicly available information. The short list of developments will regularly be updated. However, an appropriate cut off has been applied prior to publication of the PEIR to allow the assessment to be finalised. Therefore, new applications which come forward after the cut -off have not been included in the PEIR but will be brought forward to the ES. Where further information becomes available on developments already considered, this will be taken into account before the ES is finalised. However, it is noted that new developments coming forward after the cut-off date for the ES could be considered during the examination period if considered necessary and appropriate by the Examining Authority.

19.5.2 As with any assessment of cumulative effects, the outcome is based on the amount of information available for each other developments on the short list. The level of information available depends on which stage in the planning process the development is at: ie those for which an application has been submitted will have more information available compared to allocations in a local development plan. Similarly, the likelihood of a development coming forward is also highly dependent on the corresponding stage in the planning process. To overcome this, greater weight is given to those developments for which more information is available and is more likely to come forward. Any mitigation measures presented in planning applications or other planning documents for the ‘other developments’ are assumed to be brought forward in an application (if the application hasn’t yet been submitted) and implemented by the applicant (should planning permission be granted).

Inter-related Effects

19.5.3 The assessment of inter-related effects presented in this PEIR is based on information known about the Project at this stage. The assessment will be further refined at the ES stage to produce a conclusion on whether likely significant inter-related effects would arise.

19.6. Key Project Parameters

19.6.1 The key Project parameters used for the CEA and inter-relationships assessment are based on those presented in each of the topic chapters (Chapters 7 to 18 of the PEIR).

19.7. Mitigation and Enhancement Measures Adopted as Part of the Project

19.7.1 The assessment of cumulative and inter-related effects is based on the mitigation measures presented in chapters 7 to 18 of the PEIR. If potential significant cumulative or inter-related effects are considered likely, further mitigation measures which are applicable and feasible for implementation by GAL, will be presented and assessed.

19.8. Cumulative Effects Assessment

19.8.1 As stated in Section 19.4, an assessment of cumulative effects has been undertaken in each of the topic chapters of this PEIR (Chapters 7 to 18). A summary of these effects is presented in Table 19.8.1.

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Table 19.8.1: Summary of Cumulative Effects Assessment

Assessment Year	Summary	Potential for Significant Effects?
Historic Environment		
Initial Construction Phase: 2024-2029	The Horley Business Park coincides with the location of the proposed surface access satellite contractor compound for the South Terminal roundabout. The development would need to have regard to conserving the setting of listed buildings and retention of hedgerows and a buffer to the green corridor along Balcombe Road. An archaeological assessment (including field evaluation where appropriate) would be undertaken for the Horley Business Park development.	No significant effects considered likely.
2030-2032	No further cumulative effects have been identified.	
2033-2038		
Design year: 2038		
Landscape, Townscape and Visual Resources		
Initial Construction Phase: 2024-2029	**Landscape and Townscape Character** – The other developments alongside the Project would form a more developed landscape. The urban fringe characteristics of the surrounding landscape character areas would be considerably intensified as a result of the construction phase or completed relevant cumulative developments. The Project would make a negligible contribution to the overall cumulative effect. **Visual Receptors** – There could be visual overlap between the Project and Horley Business Park on receptors at PRoW 362a Horley, Meadowcroft House and occupiers of vehicles using the A23/M23 spur and trains on the railway. These effects are not likely to be significant.	Yes, for landscape and townscape effects on the High Woodland Fringes and Low Weald Character Areas. The Project would make a medium to negligible contribution to the significant cumulative effect. Visual effects would not be significant.
2030-2032	**Landscape and Townscape Character** – Following completion of the relevant developments, the urban fringe characteristics of the surrounding character areas would be considerably intensified. In the long term the character of the area would be changed to residential development within a framework of woodland and hedgerows or urban fringes would be intensified. The Project would make a negligible contribution to the overall cumulative effect.	

Assessment Year	Summary	Potential for Significant Effects?
	Visual Receptors – Receptors at Meadowcroft House would gain filtered views of Horley Business Park in combination with the South Terminal contractors compound. Receptors on the A23/M23 spur and train users would gain views of the Horley Business Park and the South Terminal contractors compound. These effects are not likely to be significant.	
2033-2038	**Landscape and Townscape Character** – The cumulative effect would remain as per the 2030-2032 assessment with the exception of the Mole Valley Open Weald Character Area which would not experience any long-term cumulative effects. **Visual Receptors** – The introduction of the South Terminal roundabout improvements including the flyover would be viewed alongside the development at Horley Business Park from receptors at Meadowcroft House, the occupiers of vehicles on the A23/M23 spur and railway passengers.	
Design year: 2038 and beyond	**Landscape and Townscape Character** – Contractor compounds would be removed and some land would be restored to its former use. This would reduce the Project's contribution to landscape effects in the Low Weald Character Area. **Visual Receptors** – The cumulative effect would remain as per the 2033-2038 assessment.	
Ecology and Nature Conservation		
Initial Construction Phase: 2024-2029	Developments would result in the permanent loss of existing habitats and would have effects on protected and notable species, although losses would be compensated for. Construction of these developments could give rise to disturbance impacts, which have potential to result in greater disturbance to species if construction overlaps with the construction of the Project. The other developments have recorded the presence of grass snake, great crested newt, common toad, badger, harvest mouse and hedgehog and the loss of habitat across the developments could impact these species.	No significant effects would be likely as each development would mitigate their impacts.
2030-2032	Two developments within 2 km of the Project would be potentially under construction during the first full year of operation when parts of the Project would still be under construction. A number of developments would be operational and any habitat creation would be complete thereby compensating for any construction phase cumulative effects and potentially offering additional habitats to more mobile species. No detailed ecology	A detailed assessment cannot be undertaken due to the lack of ecological
2033-2038		

Assessment Year	Summary	Potential for Significant Effects?
	assessments have been undertaken for these other developments, without which it is not possible to determine cumulative effects at this stage.	information for the other developments.
Design year: 2038	It is not possible to determine cumulative effects at this stage.	
Geology and Ground Conditions		
Initial Construction Phase: 2024-2029	The only developments which could result in cumulative effects are the Horley Business Park and Hookwood site. Both developments would result in the permanent sealing of the soil resource, however any cumulative effect with the Project is considered to be not significant. No surface or groundwater bodies link any of the other developments with the Project. Any contamination found on the site of the other development would be mitigated. Horley Business Park is not in an area designated for mineral safeguarding; therefore, no effects are considered likely in relation to mineral resources.	No significant effects considered likely.
2030-2032	No further cumulative effects have been identified.	
2033-2038		
Design year: 2038		
Water Environment		
Initial Construction Phase: 2024-2029	It is assumed that the other developments would include appropriate drainage and flood risk measures to prevent the increase in flood risk off site. Measures embedded in the design of other developments would also ensure no effects on water quality are seen. The combination of the Project and other developments could result in increased pressure on the foul water network and the potable water supply. All development would be taken into account by Thames Water and Sutton and East Surrey Water during their respective assessments for foul water capacity.	No significant effects considered likely.
2030-2032		
2033-2038		
Design year: 2038		
Traffic and Transport		
Initial Construction Phase: 2024-2029	Cumulative traffic and transport effects are inherently included in the future baseline scenarios. Highways modelling reported in Chapter 12: Traffic and Transport includes background traffic growth from TEMPRO through to 2051 based on published Local Plan data. The estimates of rail and station crowding for the PEIR	No significant effects considered likely.
2030-2032		

Assessment Year	Summary	Potential for Significant Effects?
2033-2038	also allow for background traffic growth in line with Network Rail projections. No additional cumulative assessment is considered to be required. With mitigation in place no significant effects have been identified for any of the assessment years in terms of traffic and transport. The Heathrow expansion project has not been included in the traffic modelling as the opening of a third runway at Heathrow would initially result in lower passengers using Gatwick. Therefore the most conservative assessment scenario has been undertaken.	
Design year: 2038		
Air Quality		
Initial Construction Phase: 2024-2029	Traffic data used in the assessment include known future developments and the assessment therefore incorporates cumulative impacts. As with traffic the effects of Heathrow expansion is not included as initially the Heathrow expansion would result in a lower number of passengers using Gatwick. The ADMS model takes into account all sources of pollution either as modelled sources or included in the background concentrations. Measures to reduce the effects of dust during construction would be implemented at the Project and it is assumed that the other developments would also implement suitable measures. No significant effects have been identified for any of the assessment years in terms of air quality.	No significant effects considered likely.
First Full Year of Opening: 2029		
Interim Assessment Year: 2032		
Design year: 2038	No detailed assessment of road traffic emissions has been undertaken for the design year 2038 and 2047 as road traffic emissions are anticipated to improve in future years due to changes in fleet composition, the introduction of cleaner vehicles in the fleet and increased uptake of electric vehicles. It is not anticipated that there would be any significant air quality effects from road traffic emissions in this scenario and therefore, no further cumulative effects are considered likely.	
Noise		
Initial Construction Phase: 2024-2029	The majority of other development sites are to the South of the airport. In most cases, they fall within the lower air noise contours bands, and in areas where the Project will slightly reduce air noise levels. There is potential for noise impacts on the future residents of these developments as a result of Gatwick's operations which in some cases will increase or decrease due to the Project. In seeking permission to develop	No significant effects considered likely.
First Full Year of Opening: 2029		

Assessment Year	Summary	Potential for Significant Effects?
Interim Assessment Year: 2032 Design year: 2038 2047	sites for residential use in noisy areas developers are required to consider the potential for noise impacts on future residents and to design the developments with suitable mitigation accordingly. Proposals for a third runway at Heathrow would increase aircraft noise over a wide area including in the area between the two airports. Although it seems unlikely that that LOAEL noise contours from the two projects would overlap, the design of the airspace required to facilitate a third runway at Heathrow is not developed sufficiently that allows cumulative assessment at this stage. This PEIR provides forecasts of air noise, ground noise and road traffic noise that will assist in designing for future conditions to ensure adverse effects are minimised and significant effects are avoided.	
Climate Change and Carbon		
Initial Construction Phase: 2024-2029 First Full Year of Opening: 2029 Interim Assessment Year: 2032 Design year: 2038 2047	The Climate Change Resilience assessment presented in Chapter 15: Climate Change and Carbon requires consideration of the resilience of the design of an individual project to climate change. Therefore, an assessment of cumulative effects is not relevant. The in-combination Climate Change impacts assessment considers the exacerbation of climate change on existing effects. As the climate change projections have been included within each aspect's primary assessment and are therefore carried through to the aspect-specific CEA, a separate climate change CEA is not required. Greenhouse gas emissions are inherently cumulative and therefore a cumulative assessment is not considered to be required for this Project. Further justification is provided in Chapter 15: Climate Change and Carbon.	No cumulative assessment required.
Socio-economics		
Initial Construction Phase: 2024-2029	It is expected that all the permitted schemes in Tier 1 would be under construction within the Project's initial construction phase to 2029. Whilst there is insufficient data availability to assess impacts it is considered that the construction activity generated by these cumulative schemes is likely to overlap with the initial construction period and to eventually increase the construction activity of the local study area and the labour market impact areas. Nevertheless, the cumulative effect on construction employment is not anticipated to change and no further cumulative effects are considered likely.	No significant effects considered likely.

Assessment Year	Summary	Potential for Significant Effects?
First Full Year of Opening: 2029	For the reasons set out in Chapter 16 the operational conclusions associated with the Project in 2029 are not expected to change due to the cumulative developments.	
Interim Assessment Year: 2032	No further cumulative effects have been identified.	
Design year: 2038		
Health and Wellbeing		
Initial Construction Phase: 2024-2029	Based on the inherent cumulative nature of the traffic and transport and air quality assessments, no further assessment in terms of human health is required. (The Heathrow expansion project would increase aircraft noise over a wide area including in the area between the two airports. At PEIR stage, the design of the airspace required to facilitate a third runway at Heathrow is not sufficiently developed allow for a cumulative noise assessment and as such, no health and wellbeing assessment is possible). The Horley Business Park development could result in impacts to users of local PRoWs. Measures to mitigate these impacts such as re-provision of any loss of resource are assumed to be implemented by the applicant for this development. No cumulative impacts in terms of light exposure have been identified in Chapter 8: Landscape, Townscape and Visual Resources. Measures to reduce impacts of a development on the ground conditions and water environment are assumed to be implemented by the applicant of the other developments reducing any impact.	No significant effects considered likely.
2030-2032		
2033-2038		
Design year: 2038		
Agricultural Land Use and Recreation		
Initial Construction Phase: 2024-2029	**Agricultural Land Use** – The quality of the land affected by the Project comprises lower quality Subgrade 3b land and therefore would not contribute to any cumulative loss of the best and most versatile Grades 1, 2 or Subgrade 3a land. It is not considered that losses of agricultural land resulting from the other developments together with those limited areas of grassland affected by the Project would affect agricultural productivity in the local area.	No significant effects considered likely.

Assessment Year	Summary	Potential for Significant Effects?
	Recreation – The development of the Horley Business Park could result in impacts to public footpath 362a (Sussex Border Path). Measures expected to be implemented as part of the development would reduce the effects on the users of this path.	
2030-2032	No further cumulative effects have been identified.	
2033-2038		
Design year: 2038		

19.9. Inter-relationships

Scoping of Receptors/Receptor Groups

19.9.1 This assessment considers receptors or receptor groups, such as local residents, users of local rights of way or services, that may be affected by different environmental effects generated from the Project simultaneously or concurrently. This may include, for example, particular locations where noise, air quality and visual change may all occur at the same time. All of these effects would be derived from the Project alone (ie not in combination with any other development).

19.9.2 The majority of the PEIR topic assessments consider the effects of the Project on receptors or receptor groups and, as such, many of the inter-related impacts on those receptors are considered within the topic chapters. For example, effects on ecological receptors arising from noise, visual disturbance, air quality impacts and water quality impacts are assessed within Chapter 9: Ecology and Nature Conservation. As such, the potential for inter-related effects is inherent within some topic assessments and these effects are not repeated in this chapter. A summary of the inter-relationships that exist between topics is presented in Table 19.9.1. Cells coloured blue represent an inter-relationship.

19.9.3 A scoping exercise to identify which topic areas could result in inter-related effects which have not already been considered in the topic chapter has been undertaken. Table 19.9.2 presents a summary of the scoping process and identifies the inter-related effects which are scoped out of this chapter as the effects have already been assessed in the topic chapters. All other topics are considered within this chapter.

Table 19.9.1: Summary of Relationship Between Topics and Reference to the Location of Relevant Assessment Sections of the PEIR

Topic	Historic Environment	Landscape, Townscape and Visual	Ecology and Nature Conservation	Geology and Ground Conditions	Water Environment	Traffic and Transport	Air Quality	Noise and Vibration	Climate Change and Carbon	Socio-economics	Health and Wellbeing	Agriculture and Recreation
Historic Environment		Section 7.9 and 8.9				Section 7.9		Section 7.9	Section 7.10			Section 7.9
Landscape, Townscape and Visual			Section 8.9 and 9.9			Section 8.9		Section 8.9	Section 8.10		Section 17.9	Section 9.9 and 18.9
Ecology and Nature Conservation					Section 9.9	Section 13.9	Section 11.9 and 13.9	Section 9.9	Section 9.10			
Geology and Ground Conditions					Section 10.9 and 11.9				Section 10.10		Section 17.9	
Water Environment						Section 11.8 and 11.9			Section 11.10		Section 17.9	Section 11.9
Traffic and Transport							Section 13.9		Section 12.10	Section 16.9	Section 17.9	
Air Quality									Section 13.10	Section 16.9	Section 17.9	
Noise and Vibration									Section 14.10	Section 16.9	Section 17.9	

Topic	Historic Environment	Landscape, Townscape and Visual	Ecology and Nature Conservation	Geology and Ground Conditions	Water Environment	Traffic and Transport	Air Quality	Noise and Vibration	Climate Change and Carbon	Socio-economics	Health and Wellbeing	Agriculture and Recreation
Climate Change and Carbon										Section 16.9	Section 17.9	Section 18.10
Socio-economics											Section 17.9	Section 17.9
Health and Wellbeing												Section 17.9
Agriculture and Recreation												

Table 19.9.2: PEIR Topics Scoping Summary for Inter-related Effects Assessment

Topic receptor / resource	Scoped in to the Project lifetime assessment?	Scoped in to the receptor led assessment?	Justification for exclusion/inclusion within Inter-related Effects Assessment
Historic Environment	No	No	The assessment of effects on historic environment is provided in Chapter 7: Historic Environment. This assessment considers all potential effects on the relevant receptors, namely heritage assets. This topic has drawn from other topics such as landscape and visual and noise assessment for consideration of potential impacts on heritage asset setting. No receptor led or Project lifetime effects are considered likely for buried archaeology.
Landscape, Townscape and Visual	Landscape: No Visual: Yes	Landscape: No Visual: Yes	The landscape resource is assessed in Chapter 8: Landscape, Townscape and Visual Resource. This assessment includes the consideration of all potential impacts on landscape character and landscape quality, therefore no additional inter-related effects are considered likely to occur beyond those identified within the chapter. Visual resource effects will be considered in the inter-related effects assessment.
Ecology and Nature Conservation	Yes	No	The assessment of inter-related effects is central to the assessment of potential impacts on ecological receptors and the integrity of designated sites and, as such, has already been assessed within Chapter 9: Ecology and Nature Conservation. No additional effects are therefore, considered likely to occur beyond those identified in the assessment in Chapter 9. This topic has drawn from other topics to understand the variety of impacts on ecological receptors.
Geology and Ground Conditions	No	No	All the potential impacts on geological receptors and soils have been assessed within Chapter 10: Geology and Ground Conditions, no further inter-related effects are considered likely.
Water Environment	No	No	All the potential impacts on the water environment are assessed in Chapter 11: Water Environment, no further inter-related effects are considered likely.
Traffic and Transport	Yes	Yes	The effects presented in Chapter 12: Traffic and Transport take into account all likely contributions to traffic on the surrounding road network as a result of the Project, therefore no additional traffic is considered likely. However,

Topic receptor / resource	Scoped in to the Project lifetime assessment?	Scoped in to the receptor led assessment?	Justification for exclusion/inclusion within Inter-related Effects Assessment
			the effect of driver delay prolonged over the construction period could be greater than those assessed in the assessment year. Therefore, traffic is scoped in to the Project lifetime assessment. The effect of traffic in combination with other topics could result in inter-related effects on receptor groups, therefore traffic and transport is scoped in to the receptor led assessment.
Air Quality	Yes	Yes	Human receptors could be exposed to air quality effects at the same time as effects from other topics or effects across the Project lifetime, which could result in inter-related effects. Therefore, air quality is scoped in to the Project lifetime and receptor led assessments.
Noise and Vibration	Yes	Yes	Human receptors could be exposed to noise effects at the same time as effects from other topics or effects across the Project lifetime, which could result in inter-related effects. Therefore, noise and vibration is scoped in to the Project lifetime and receptor led assessments.
Climate Change and Carbon	No	No	The effects in relation to GHGs are assessed in Chapter 15: Climate Change and Carbon and includes the effect of the entire Project on the global receptor. This assessment inherently includes Project lifetime and receptor led effects and therefore no further assessment is required. The resilience of the project in relation to the climate change has been assessed across the Project lifetime and a further assessment is not required.
Socio-economics	Yes	Yes	Human receptors include residents and businesses which could be exposed to effects from a number of different topics or effects across the Project lifetime, including socio-economics. Therefore, this topic is scoped in to the inter-relationships assessment for both the Project lifetime and receptor led effects. The Project lifetime assessment considers only effects in the Project site boundary and local study area. This is due to the wider effects being so widespread over a large area that it is not likely that effects would be greater than those considered in the chapter.
Health and Wellbeing	Yes	No	The nature of the health and wellbeing assessment presented in Chapter 17: Health and Wellbeing draws from all environmental and socio-economic topics that have the potential to affect determinants of health and wellbeing.

Topic receptor / resource	Scoped in to the Project lifetime assessment?	Scoped in to the receptor led assessment?	Justification for exclusion/inclusion within Inter-related Effects Assessment
			Therefore, all potential inter-related effects in relation to health and wellbeing are considered within Chapter 17. The change in health of human receptors across the lifetime of the Project is considered in this assessment.
Agricultural Land Use and Recreation	No	Yes	The effects on land use and agriculture are considered in Chapter 18: Agricultural Land Use and Recreation. The effects on agricultural land and farm holdings are likely to be permanent and occur during the construction phase. Therefore, further inter-related effects from other topic areas are unlikely to result in any greater effect than those assessed within Chapter 18. Effects on recreational resources have been assessed taking into account other topic areas such as visual and tranquillity (Chapter 8) and increased pressure on resources (Chapter 18). However, inter-related effects on recreational receptors are presented in this chapter.

Identification of Receptors/Receptor Groups

19.9.4 The potential for inter-related effects (other than those already inherently forming part of the topic-specific assessments where specified in Table 19.9.2 is limited to the ZoI presented in Table 19.4.2. Inter-related effects have been considered where the study areas of the respective assessments are shared.

Project Lifetime Effects

19.9.5 Table 19.9.3 lists the lifetime inter-related effects that are predicted to arise during construction and operation of the Project. A discussion on how the identified effects could change over the lifetime of the Project is also presented in Table 19.9.3

Table 19.9.3: Assessment of Project Lifetime Effects

Topic Area	Rector or Receptor Group	Significance of Individual PEIR Effect with Mitigation	Project Lifetime Inter-related Effects
Visual Resources	Receptors using public rights of way and pavements	2024-2029: Major to Negligible adverse 2030-2032: Major to Negligible adverse 2033-2038: Moderate to Minor beneficial 2038 and beyond: Moderate adverse to Minor beneficial	The visual effects considered in Chapter 8: Landscape, Townscape and Visual Resources relate to a number of different receptors and the effects vary widely depending on the distance from the development and the sensitivity of the receptor. The greatest effects are likely to be realised by the users of the PRoW network, especially around the Pentagon Field area, which would see a change in view from open fields to a decked car park. The largest effects are likely to be felt during the construction phase (which spans over the first three assessment years) and other visual effects would be experienced in the context of the existing airport. Overall, is it not likely that the Project lifetime effects would be greater than those assessed for each of the assessment years.
	Occupiers of airport hotels and restaurants (outside of terminals)	2024-2029: Moderate to Minor adverse 2030-2032: Moderate to Minor adverse 2033-2038: Major to Negligible adverse 2038: Moderate to Negligible	
	Employees (on and off airport) and visitors	2024-2029: Minor to Negligible adverse 2030-2032: Minor to Negligible adverse 2033-2038: Moderate to Negligible adverse 2038: Negligible to Moderate adverse	
	Vehicle occupiers	2024-2029: Minor to Negligible 2030-2032: Moderate to Negligible adverse 2033-2038: Moderate to Negligible adverse 2038: Moderate to Negligible adverse	
	Residents	2029: Moderate to Minor adverse 2038: Moderate to Minor adverse	

Topic Area	Rector or Receptor Group	Significance of Individual PEIR Effect with Mitigation	Project Lifetime Inter-related Effects
Ecology and Nature Conservation	Statutory designated Sites	All assessment years: No Change	No effects are considered likely to statutory designated sites; therefore, no inter-related effects are considered likely.
	Non-statutory Designated Sites and ancient woodland	All assessment years: No Change	The effects assessed in Chapter 9: Ecology and Nature Conservation consider the combined effects during construction and operation of the Project. The effects are not likely to be greater when considered over the lifetime of the Project.
	Habitats and flora	2024-2029: No Change to Moderate adverse 2030-2032: No Change to Moderate adverse 2033-2038: Negligible to Moderate adverse	An assessment of the overall net gain or loss of habitats as a result of the Project has been undertaken. This identifies there will be no net habitat loss overall and some habitats would experience a betterment. Some habitats, such as woodland, would take longer to establish, however habitat creation would be implemented early in the construction programme. The long term effect on designated sites has been considered through the appropriate assessment process. Therefore, no further Project lifetime effects are considered likely.
	Breeding birds and wintering birds	2024-2029: Minor beneficial to Moderate adverse 2030-2032: Minor beneficial to Moderate adverse 2033-2038: Negligible to Minor adverse	The assessment on breeding birds presented in Chapter 9: Ecology and Nature Conservation has taken into account the overall loss and creation of habitat as a result of the Project. During construction, loss of habitat would occur in different places at different times. Birds using these areas could experience, over time, prolonged loss and disruption. The reduction in habitat could reduce the overall size of the breeding bird population due to increased competition for territory. The creation of habitat in the west of the site would mitigate this effect, however this would take time to mature in order to be attractive for breeding. Collision risk could increase over the lifetime of the Project, however this is considered in the assessment in Chapter 9: Ecology and Nature Conservation. Therefore, no further Project lifetime effects are considered likely.
	Grass snake, great crested newt, common	2024-2029: No Change to Minor adverse	Effects on these species are only likely to occur during the construction phases of the Project when habitat losses would occur. The habitat creation would

Topic Area	Rector or Receptor Group	Significance of Individual PEIR Effect with Mitigation	Project Lifetime Inter-related Effects
	toad, otter, harvest mouse and hedgehog	2030-2032: Minor beneficial to Minor adverse 2033-2038: Negligible to Minor adverse 2038: Negligible (otter)	mitigate effects on these species. Therefore, no further Project lifetime inter-related effects are considered likely.
	Bats and badgers	2024-2029: Minor adverse to Negligible (for badgers). Minor adverse (for bats) 2030-2032: Negligible (for badgers) Minor beneficial to Moderate adverse (for bats) 2032-2038: Negligible (for badgers) Negligible to Moderate adverse (for bats) 2038: Negligible (for badgers) and No change (for bats).	Effects on bats and badgers are related to habitat loss and collision risk. Habitat loss effects would only occur during the construction phase and would be mitigated by habitat creation. Collision risk could increase over the lifetime of the Project, however this is considered in the assessment in Chapter 9: Ecology and Nature Conservation. The overall Project lifetime effects on these species are not likely to be greater than those considered in Chapter 9.
Traffic and Transport	Pedestrians and cyclists	2024-2029: Negligible to Minor adverse 2030: Negligible 2032: Minor adverse to Minor beneficial 2038: Minor adverse to Minor beneficial	The effects on pedestrians, cyclists and public transport users include severance, delay, amenity and safety. These types of effects would only be experienced at the time the effect occurring and would not increase due to the duration of the impact. The receptors are likely to be felt in a transient nature only as pedestrians or cyclists move through the area.
	Public transport users	2024-2029: Negligible to Minor adverse 2029: Negligible 2032: Negligible 2038: Negligible	
	Car drivers and passengers	2024-2029: No Change to Moderate adverse 2029: No Change to Minor adverse 2032: Minor adverse to Minor beneficial 2038: Minor adverse to Minor beneficial	The effects on car drivers and passengers include driver delay, driver stress, views from the road, safety and hazardous loads. Over the lifetime of the Project driver stress could increase due to prolonged delays and perception to safety. The effect however is not likely to change from those presented in Chapter 12: Traffic and Transport due to the transient nature of the receptors

Topic Area	Rector or Receptor Group	Significance of Individual PEIR Effect with Mitigation	Project Lifetime Inter-related Effects
			through the area and the limited extent of the effects. All other types of effects are not likely to change over the lifetime of the Project.
Air Quality	Human receptors and property (construction dust)	2024-2032: Not Significant	The air quality assessment is based on the difference between background concentrations and the increase in emissions as a result of the Project. Based on this concept, the Project lifetime effects are inherently included in the changes to background concentration levels across the assessment years. The assessment also takes into consideration the duration of exposure for each receptor. Therefore, the Project lifetime effects are not likely to be greater than those assessed within the chapter.
	Human receptors	2024-2032: Not Significant 2038: Not assessed in detail for the PEIR	
	Ecological receptors	2024-2032: Not Significant 2038: Not assessed in detail for the PEIR	
Noise and Vibration	Residential	**Construction noise** 2024-2029: Moderate (after mitigation) subject to further assessment	The assessment of noise across all assessment years covers the likely sources of noise occurring at each particular time. The only Project lifetime effects related to noise would be the effect continued noise exposure has on the health of residents. The Project lifetime health effects are considered under the health and wellbeing heading.
		Air noise 2029: Lower than 2032 2032: Minor beneficial to Moderate adverse 2038: Lower than 2032	
		Ground noise 2029: Lower than 2032 2032: Negligible to Moderate adverse 2038: Lower than 2032	

Topic Area	Rector or Receptor Group	Significance of Individual PEIR Effect with Mitigation	Project Lifetime Inter-related Effects
		Traffic noise 2032: Not Significant to Significant beneficial	
Socio-economics (Project site and local study area only)	Employment	2024-2029: Minor to Major beneficial 2029-2032 (Construction): Minor to Moderate beneficial 2029 (Operational): Negligible to Minor beneficial 2032-2037 (Construction): Negligible to Minor beneficial 2032 (Operational): Negligible to Moderate beneficial 2038: Negligible to Moderate beneficial	The socio-economic effects are likely to be experienced across the local study as defined in Chapter 16: Socio-economics. Over the lifetime of the project similar effects associated with construction and operation are likely to be felt across all assessment years. Construction and operational effects on the labour market and supply chain are mutually exclusive from each other as they will attract different skills and have a different supply chain. Therefore, the same receptors would not be impacted during both the construction and the operation. Business and local population (including cohesion and community facilities) could experience disruption as a result of construction and operation, however this combination has already been taken into consideration in the traffic modelling undertaken for the Project. The effects on the economy have been assessed to be beneficial across all assessment years. The combined effect over the lifetime of the Project is not likely to be higher than those assessed within the chapter.
	Supply chain	2024-2029: Minor beneficial 2029-2032 (Construction): Negligible to Minor beneficial 2029 (Operational): Minor to Moderate beneficial 2032-2037 (Construction): Negligible to Minor beneficial 2032 (Operational): Minor to Major beneficial 2038: Minor to Major beneficial	
	Labour market	2024-2029: Negligible to Minor beneficial	

Topic Area	Rector or Receptor Group	Significance of Individual PEIR Effect with Mitigation	Project Lifetime Inter-related Effects
		2029-2032 (Construction): Negligible to Minor Beneficial 2029 (Operational): Negligible 2032-2037 (Construction): Negligible to Minor beneficial 2032 (Operational): Negligible to Moderate to Minor adverse 2038: Minor to Moderate adverse	
	Businesses (disruption / displacement)	2024-2029: Minor adverse to Negligible 2029-2032 (Construction): Minor adverse to Negligible 2029 (Operational): Negligible 2032-2037 (Construction): Moderate adverse to Negligible 2032 (Operational): Moderate adverse to No Change 2038: No Change	
	Existing residents	2024-2029: Minor adverse to Negligible 2029-2032 (Construction): Minor adverse to Negligible 2029 (Operational): Minor adverse to Negligible 2032-2037 (Construction): Minor adverse to Negligible 2032: Minor adverse to Negligible 2038: Negligible to Minor adverse	
	Population	2024-2029: Negligible	

Topic Area	Rector or Receptor Group	Significance of Individual PEIR Effect with Mitigation	Project Lifetime Inter-related Effects
		2029-2032 (Construction): Negligible 2029 (Operational): Negligible 2032-2037 (Construction): Negligible 2032 (Operational): Negligible 2038: Negligible	
	Housing	2024-2029: Negligible 2029-2032 (Construction): Negligible 2029 (Operational): Negligible 2032-2037 (Construction): Negligible 2032 (Operational): Negligible 2038: Negligible	
	Community facilities and services	2024-2029: Minor adverse 2029-2032 (Construction): Minor adverse 2029 (Operational): Minor adverse 2032-2037 (Construction): Minor adverse 2032 (Operational): Minor adverse to Negligible 2038: Minor adverse to Negligible	
	Community cohesion	2024-2029: Minor adverse 2029-2032 (Construction): Minor adverse 2029 (Operational): Minor adverse to Negligible 2032-2037 (Construction): Minor adverse	

Topic Area	Rector or Receptor Group	Significance of Individual PEIR Effect with Mitigation	Project Lifetime Inter-related Effects
		2032 (Operational): Minor adverse to Negligible 2038: Minor adverse to Negligible	
	Open Space – Riverside Garden Park	2029-2032 (Construction): Moderate to minor adverse	
Health and Wellbeing	Health and wellbeing effects from changes in air quality	2024-2029: Minor adverse 2030-2032: Minor adverse 2033-2038: Minor adverse 2038: Minor adverse	The main health and wellbeing assessment analyses changes in annual average concentrations and how this affects annual average background concentrations. While there would be chronic exposure to the changes predicted, background concentrations remain relatively constant and do not accumulate. Taking into consideration the predicted changes, the predicted annual average background concentrations remain within air quality objective thresholds set to be protective of the environment and health in all circumstances and therefore the conclusions of the main health and wellbeing would not be greater when considered across the lifetime of the Project.
	Health and wellbeing effects from changes in noise exposure	2024-2029: To be assessed at ES stage 2030-2032: Minor adverse 2033-2038: Minor adverse 2038: Minor adverse	Predicted health and wellbeing effects relating to the incidence of health outcomes are generally measured as an annual rate. While changes in noise exposure for any given year are predicted to have a measurable increase in risk factors, there is no measurable increase in actual health outcomes. If the time period for incidence rate were to increase from an annual rate between the years of 2029 (first full year of operation) to 2040 (two years after the design year), there would still not be a measurable change in health outcomes. Impacts on the prevalence of health outcomes cannot be added in the same way, as this measure looks at the total proportion of a population who have a condition; as a result, the worst-case impact would be the impact which is recorded for 2032. Therefore, the conclusions of the main health and wellbeing chapter would not be greater when considered across the lifetime of the Project.

Topic Area	Rector or Receptor Group	Significance of Individual PEIR Effect with Mitigation	Project Lifetime Inter-related Effects
	Health and wellbeing effects from changes in transport nature and flow rate	2024-2029: Minor adverse 2030-2032: Minor adverse 2032: Minor adverse 2038: Minor adverse	As stated within Chapter 17: Health and Wellbeing, there is limited exposure to changes in traffic volume and composition is low as there are limited pedestrian and cyclist movements expected along affected routes. In addition, health and wellbeing effects on pedestrians and cyclists would only be experienced at the time the effect occurring and would not increase due to the duration of the impact due to the transient nature of these receptors. In addition, health and wellbeing effects associated with accidents and safety is not likely to change over the lifetime of the Project as risk of accidents is primarily dependent on constant factors such as traffic volumes and road capacity.
	Health and wellbeing effects from changes in lifestyle factors	2024-2029: Minor beneficial 2030-2032: Minor beneficial 2033-2038: Minor beneficial	As stated within Chapter 17: Health and Wellbeing, permanent impacts carry more weight in the potential to impact on barriers to recreation/physical activity and the associated health and wellbeing effects. It is the case that any adverse permanent impacts reported do not completely remove the opportunity for access to recreation or physical activity. Therefore, the impacts would not accumulate over the lifetime of the project.
	Health and wellbeing effects from changes in socio-economic factors	2024-2029: Minor beneficial 20230-2032: Minor beneficial 2033-2038: Moderate beneficial 2038: Moderate beneficial	Within Chapter 17: Health and Wellbeing, it is stated that “Having a consistent income and being in long-term employment are two of the most important wider determinants of health”. As such, the length of employment for individuals is a key consideration when assessing magnitude/significance of effect for this health determinant, whereby only a significant generation of long-term employment would have beneficial health and wellbeing effects at the population level. Is it considered that the significance of effects undertaken for 2038 would be representative of the Project lifetime effects and no greater effect would occur.
	Health and wellbeing effects from changes in exposure to light	2024-2029: Minor adverse 2030-2032: Minor adverse 2033-2038: Minor adverse	The existing baseline includes sky glow which is visible during the night time period at residences that surround the site. The main assessment reports an increase in exposure to light at approximately 99 residences at Horley

Topic Area	Rector or Receptor Group	Significance of Individual PEIR Effect with Mitigation	Project Lifetime Inter-related Effects
		2038: Minor adverse	Residential Edge during winter only as vegetation in leaf during the summer period would provide screening effects. Considering that this impact would firstly be seasonal, and on the basis that new tree/shrub planting, which would develop over time to reduce the level of effects, there would be no consistent accumulation of effects. Conversely, this seasonal impact would lessen over time.
	Health and wellbeing effects from changes to water quality and flood risk	2024-2029: Minor adverse 2030-2032: Minor adverse 2033-2038: Minor adverse 2038: Minor beneficial	All potential impacts on water quality and flood risk are expected to be mitigated to a level which is not considered significant. All mitigation measures offer long-term approaches to the management of water quality and flood risk. Therefore, there is no risk of an additive impact over the lifetime of the project and consequent health and wellbeing effects.
	Health and wellbeing effects from ground conditions	2024-2029: Minor adverse 2030-2032: Minor adverse 2033-2038: Minor adverse 2038: Minor adverse	All complex remediation activities are expected to occur during the initial construction phase which is already assessed in the chapter and any exposure would be temporary. Exposure to contamination would generally need to be consistent in order to manifest any health or wellbeing outcome. As a result, no additive impacts on health and wellbeing over the lifetime of the Project are anticipated.
	Health and wellbeing effects from changes in healthcare capacity	2024-2029: To be assessed at the ES stage 2030-2032: Minor adverse 2033-2038: Minor adverse 2038: Minor adverse	As stated in the main assessment, if the peak number of construction workers were to move temporarily to the local study area from outside, it would equate to a worst-case increase in the local population of approximately 1% which would persist for the peak year of construction only (2026). The construction workforce in all other years would be less than this and there would be no accumulation of effects over the lifetime of the Project (construction-phase, specifically). It should also be noted that an on-site health service provision has been recommended in order to internalise any increase in demand on local healthcare capacity so even if there was an increase of 1%, it is anticipated that

Topic Area	Rector or Receptor Group	Significance of Individual PEIR Effect with Mitigation	Project Lifetime Inter-related Effects
			this would not have an external impact. Therefore, the impacts would not accumulate over the lifetime of the Project.

Receptor-led Inter-related Effects

19.9.6 Table 19.9.4 identifies those receptor groups which are unlikely to experience receptor led inter-related effects or where such inter-related effects have already inherently been assessed through the methodology of the respective topic chapter. The remaining topics which could result in additional inter-related effects are:

- visual resources;
- traffic and transport;
- air quality;
- noise and vibration;
- socio-economics; and
- recreation

19.9.7 The effects identified for these topics have the potential, when occurring at the same time, to affect the same receptors, which could result in a greater effect than if they occurred on their own. An inter-related effect is likely to occur when the effects of two or more topics overlap either spatially or temporally. Due to the long term duration of the construction phase, it is likely that both construction and operational effects from different topics would overlap temporally. Therefore, for the preliminary commentary presented in this PEIR it is assumed there all potential inter-related effects could occur at the same time.

19.9.8 The receptor groups that are likely to experience multiple effects are limited to the receptors located in the ZoIs identified in Table 19.4.2. Based on the assessments included in Chapters 7 to 18, the following receptor groups have been identified which could experience effects from multiple environmental topic areas.

- Long term receptors (residents, users of schools and community facilities, places of work). These are likely to be long term receptors in that they are likely to experience the effects over a longer period of time.
- Short term receptors (traveller, pedestrians/cyclists and users of PRoWs). These are likely to be short term or intermittent receptors as they are only likely to experience effects for a short period of time while passing through.

19.9.9 For each receptor group, Table 19.9.4 lists the potential effects on these receptors.

Table 19.9.4: Receptor Groups and Potential Impacts

Receptor Group	Potential Impact
Long term receptors: people living at dwellings and users of schools and work places	Potential impacts include changes in the level of traffic (including HGVs and air traffic) which would lead to an increase in noise and emissions. The combination of an increase in noise from surface and air sources, and the perception of more traffic could result in a greater impact than when assessed alone. Receptors could also experience a change in views with more built infrastructure in certain areas and additional aircraft.

Receptor Group	Potential Impact
Short term or intermittent receptors: people using PRoWs and local road network	Users of PRoWs in proximity to the airport could experience a combination of increase noise, emissions and frequency of aircraft taking off. Views on some routes would change from agricultural fields to built development (eg Pentagon Field).

Long Term Receptors

19.9.10 A number of communities representing long term receptors have been identified in the ZoI for the Project. These are presented in the list below and on Figure 19.9.1. The identified communities are based on the parish boundaries within 5 km of the Project site boundary. The communities include all residential receptors, users of schools and places of work. Communities based outside of the 5 km are not likely to experience effects from more than one topic based on the ZoIs identified for the topics scoped in to the assessment.

- Crawley.
- Rusper.
- Charlwood.
- Newdigate.
- Salfords and Sidlow.
- Horley.
- Outwood.
- Burstow.
- Horne.
- Felbridge.
- Worth.

19.9.11 Work undertaken to date indicates that the majority of traffic (80%) currently access the airport via the M23 spur road while all remaining traffic is spread over the local road network. The highways model used for the PEIR has been developed to focus on the roads surrounding the airport which are likely to be impacted by the Project. The air quality effects likely to contribute to long term receptor led inter-related effects are likely to be constrained to emissions from road traffic. Therefore, air quality effects are also only likely to be felt locally to the airport. The receptors within these areas are mainly those using the PRoW network, the road and rail network or are passengers at the airport. These are short-term receptors and are considered below. The main long term receptors within the extent of the traffic model (indicating receptors that could be impacted by different topic areas) would be members of staff working at the airport or in proximity to it. These include hotel and restaurant staff, and workers at Lowfield House, Manor Royal, Schlumberger, Meadowcroft House and Amadeus. Residential receptors in closer proximity to the eastern part of the airport could also be considered as long term receptors. These receptors are likely to experience an increase in traffic close to their place of work/home, a potential increase in vehicle emissions as well as an increase in noise and visual disturbances.

19.9.12 More distant from the airport, receptors are only likely to experience a combination of noise and visual effects. The socio-economic effect of the Project is likely to be felt across all community groups and it is not possible to assign a particular parish which is likely to experience greater or lesser effects than others. Chapter 8: Landscape, Townscape and Visual Resources uses representative viewpoints to assess the visual effects of the Project on receptors. These are

based on the areas which are likely to result in visual effects. Only three of the identified parishes have representative viewpoints (Crawley, Charlwood and Horley). Visual effects on other parishes are likely to be negligible or no greater than those assessed for the representative viewpoints and therefore are not considered further. Due to the lack of spatial overlap between topic areas, the remaining parishes are not likely to result in inter-related effects.

19.9.13 Based on the community representative locations modelled to inform Chapter 14: Noise and Vibration, long term receptors in the three parishes (Crawley, Charlwood and Horley) could experience a noise increase from air noise sources. The visual effects for these areas have been assessed, across all assessment years, as Negligible to Moderate (not significant).

19.9.14 Inter-related effects on long term receptors in Crawley, Charlwood and Horley could therefore be felt as a combination of an increase in traffic, emissions, noise and visual disturbances. The combination of some of these effects are taken into account in the assessment outlined in Chapter 17: Health and Wellbeing. These include effects from traffic, air quality, light exposure, flood risk, ground conditions and socio-economic factors. Significant effects are not likely to occur with the exception of long term significant beneficial effects in relation to socio-economic factors. Due to the nature of the inter-related effects, many of which would be intermittent and would occur at a distance from the receptors, further significant effects are not considered likely.

19.9.15 The assessment of inter-related effects on long term receptor groups will be further updated in the ES.

Short Term Receptors

19.9.16 A number of short term receptors have been identified in the ZoI for the Project. These are presented in the list below and on Figure 19.9.2.

- Users of PRoW and other recreational routes in the immediate vicinity of the Project site boundary or directly linking to it.
- Users of the local road and rail network.
- Passengers of the airport.

19.9.17 The recreational resources most likely to experience inter-related effects are Riverside Garden Park, National Cycle Route 21, the Sussex Border Path (PRoW 346Sy, 346-2Sy, 347Sy and 355-1Sy) and the PRoW at Pentagon Field. Due to their proximity to the airport these receptors would experience a change in visual amenity, noise, traffic and vehicle emissions. The extent to which these effects would be felt would vary between each individual human receptor. It would depend on their reason for using the recreational facility, how often they use it and the extent of the change.

19.9.18 Those receptors using these resources for recreational purposes are deemed to be more sensitive to changes compared with those using them for commuting or access. The assessment undertaken in Chapter 18: Agriculture and Recreation determines that there would be no significant effects on users of PRoW in the long term with a significant long term moderate adverse effect on Riverside Park. These conclusions would not likely change when taking into account additional factors such as noise, visual amenity and emissions.

19.9.19 Other short term receptors include users of the road and rail network around the airport and passengers using the airport itself. These users would experience a change in traffic flows, visual amenity and noise. As with users of recreational facilities, the extent of the effect would depend

on their purpose for using the road/rail network, however most receptors are likely to be passing through for travel purposes, rather than recreation. Therefore the changes in traffic flows, visual amenity and noise would result in a lower effect. Effects greater than those presented in the PEIR are not considered likely due to the low sensitivity of these receptors.

19.9.20 As with the assessment for long term receptors above, the assessment of inter-related effects on short term receptor groups will be further updated in the ES.

19.10. Summary

19.10.1 This chapter considers the cumulative and inter-related effects arising from the Project during the construction and operational phases. The cumulative assessment uses a short list of 'other developments' which could result in cumulative effects on the same receptors as the Project. The assessment of inter-relationships uses the assessments in each of the topic chapters of the PEIR and considers whether additional effects over the lifetime of the Project or from multiple topics on the same receptor could occur.

19.10.2 The CEA concludes that significant effects are not likely in relation to many of the topic areas. Significant effects could occur in relation to the High Woodland Fringes Character Area and Low Weald Character Area when considered with other developments. However, the contribution of the Project to this significant effect is considered to be medium to negligible. No further significant effects are considered likely.

19.10.3 Inter-related effects could occur in two ways; a single impact extended over the lifetime of the Project (Project lifetime effects), and a combination of effects from a number of different topic areas (receptor led effects). Project lifetime effects could occur in relation to visual effects, ecology, air quality, noise and health and wellbeing. None of the Project lifetime effects considered at this stage in the EIA process are likely to be significant.

19.10.4 Receptor led effects are likely to be felt in two main receptor groups; long term and short term receptors. These relate to communities (identified using parish boundaries) and users of the local PRoW and road/rail network. The inter-related effects on these receptors are likely to be limited to noise, air quality, visual, traffic and transport and socio-economic effects. Due to the preliminary nature of the PEIR a more detailed assessment of the likely significance of inter-related effects will be undertaken in the ES.

Next Steps

19.10.5 The long list and short list of other developments to inform the CEAs will continually be updated throughout the EIA process. Any additional developments that have been identified through the consultation process and during the drafting of the ES will be added to the long list and reviewed for inclusion in the short list. A cut-off date of three months before submission of the application will be implemented to allow for the final preparation of the ES.

19.10.6 The assessment of inter-relationships will also be further updated for the ES. Following finalisation of the design parameters and the full assessment of effects in the topic chapters, an updated assessment of the likely inter-relationships will be carried out. The chapter will come to a conclusion as to whether the inter-relationships will result in a larger effect than considered within the topic chapters.

19.11. References

Legislation

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19.12. Glossary

Table 19.12.1: Glossary of Terms

Term	Description
CEA	Cumulative Effects Assessment
DMRB	Design Manual for Roads and Bridges
EIA	Environmental Impact Assessment
ES	Environmental Statement
GAL	Gatwick Airport Limited
GHG	Greenhouse gas
HGV	Heavy Goods Vehicle
NPPF	National Planning Policy Framework
NPPG	National Planning Practice Guidance
NPR	Noise Preferential Route
NPS	National Policy Statement
PEIR	Preliminary Environmental Information Report
PRoW	Public Right of Way
SAC	Special Area of Conservation
ZoI	Zone of Influence
ZTV	Zone of Theoretical Visibility

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20 Summary of Effects

20.1. Introduction

20.1.1 This chapter provides a summary of the findings of the environmental assessment work undertaken to date concerning the potential effects (adverse and beneficial) of the proposal to make best use of Gatwick Airport's existing runways (referred to within this report as 'the Project'). Full details of the findings of the Environmental Impact Assessment (EIA) process undertaken to date are provided in the individual topic chapters (Chapters 7 to 19) of this Preliminary Environmental Information Report (PEIR).

20.1.2 This summary and the table provided at the end of this chapter (Table 20.2.1) focus on the significant effects identified for each phase of the Project on a topic by topic basis. Details of all adverse and beneficial effects (including the effects predicted not to be significant) are provided in the summary table at the end of each topic chapter).

20.2. Summary of Effects

Historic Environment

Initial Construction Phase: 2024 to 2029

20.2.1 Chapter 7: Historic Environment of the PEIR, concludes that the majority of effects as a result of the Project during the initial construction phase (2024-2029) would not be significant. However, construction of some contractor compounds (in previously undeveloped areas), some of the excavation required for the flood compensation works and environmental mitigation and the placement of spoil and construction of parking at Pentagon Field could result in effects of up to **major adverse** significance. This would occur only in the event that buried archaeological remains are present in these locations and that the features are of a high levels of sensitivity to development. Further archaeological investigation will review the value of the existing resource, if any, and therefore, the assessment is a worst case. In some cases, with appropriate mitigation measures in place, the significance of effect would reduce to **negligible or minor adverse**. Where it is not possible to apply any mitigation measures, the effects would be offset by a programme of further archaeological investigation.

20.2.2 The relocation of Pond A and the diversion of the River Mole could impact on possible palaeochannels, while the construction of the replacement 'Purple Parking' at the western end of Crawter's Field could affect buried archaeological resources, where present. These activities could lead to an effect of up to **moderate adverse** significance. As above, this is a worst case assessment and the effect would be offset by a programme of geoarchaeological investigation.

20.2.3 Other effects would not be significant. These include a predicted **minor adverse** effect on the character of the historic landscape at Pentagon Field and a **minor adverse** effect arising from the demolition of the former air traffic control tower (which would represent an effect that would be offset by recording of the building prior to its demolition).

Ongoing Construction and Operation: 2030 to 2032

20.2.4 During the period 2030-2032, there could be effects arising from impacts on buried archaeological remains during the establishment of the surface access satellite compound north

of Longbridge Roundabout and environmental mitigation works required in the northern part of car park B. These effects could be up to **major adverse**, as a worst case. With appropriate mitigation measures in place the significance of effect would reduce to **minor adverse**, which would not be significant. Where it is not possible to apply any mitigation measures, the effects would be offset by a programme of further archaeological investigation.

20.2.5 Other effects would not be significant. These include an effect of **minor adverse** significance as a result of the change within the setting of the Church Lane (Horley) Conservation Area. There would also be **minor adverse** effects resulting from changes within the settings of the Grade II* listed Charlwood Park Farmhouse, several Grade II listed buildings at Charlwood and the Conservation Area at Charlwood as a result of the relocation of the CARE facility.

20.2.6 There would be **minor adverse** effects on the significance of the Grade I listed Church of St Nicholas (Charlwood), also The Manor House (Charlwood), Providence Chapel (Charlwood) and Charlwood Park Farmhouse (all Grade II* listed buildings), and **negligible adverse** effects on the significance of the Conservation Area and several Grade II listed buildings at Charlwood.

Ongoing Construction and Operation: 2033 to 2038

20.2.7 During the period 2033-2038, the construction of the flood storage area east of Gatwick Stream would lead to the complete loss or substantial damage of buried archaeological remains resulting from the reduction of ground levels. This would result in up to a **major adverse** effect (as a worst case), which would be offset through a programme of further archaeological investigation.

2038: Operational Phase

20.2.8 No further effects on the historic environment are considered likely during the operational phase of the Project.

Landscape, Townscape and Visual Resources

20.2.9 Chapter 8: Landscape, Townscape and Visual Resources identifies the character and features of the landscape and townscape and assesses the changes that would result as a consequence of the Project. In addition, it considers the potential visual effects arising as a result of the Project.

Initial Construction Phase: 2024 to 2029

20.2.10 In the initial construction phase, the creation of parking at Pentagon Field and replacement Purple Parking at Crawter's Field would result in the loss of relatively large areas of grassland and green infrastructure within the airport leading to **major adverse** and significant effects in relation to the immediate landscape character of Pentagon Field. However, the effects on the wider local Gatwick Airport Character Area would be **minor adverse**, during the day and at night, which would not be significant. Other effects on landscape and townscape character would not be significant.

20.2.11 The works at Pentagon Field would result in visual effects for walkers using public rights of way and the pavement adjacent to Pentagon Field, who would have views of construction works resulting in **major adverse** effects in the short to medium term, which would be significant. These effects would reduce in later phases, as the planting proposed as part of the Project matures and becomes more effective in terms of screening. Other effects on views would not be significant.

Ongoing Construction and Operation: 2030 to 2032

20.2.12 During this period, the completed car park at Pentagon Field would continue to give rise to a significant effect on the localised landscape character within Pentagon Field. This effect would be **major adverse** and significant effects in relation to the immediate landscape character of Pentagon Field. However, the effects on the wider local Gatwick Airport Character Area would be **minor adverse**, during the day and at night, which would not be significant. Other effects on landscape and townscape character would not be significant. No other significant effects on landscape or townscape character would occur during this period.

20.2.13 In the first full year of operation walkers using public rights of way adjacent to Pentagon Field and pavement along Balcombe Road would have views of construction works, resulting in **major adverse** effects, which would be significant. Occupiers of the Hilton Hotel would gain near open views of the new hotel, office and multi-storey car park initially under construction and then when complete resulting in **major adverse** and significant effects. Other effects on views would not be significant.

Ongoing Construction and Operation: 2033 to 2038

20.2.14 During this period, the effects from the car park at Pentagon Field and the Gatwick Airport Character Area would remain as reported above and therefore significant. By this time, visual effects, including those on walkers using public rights of way adjacent to Pentagon Field; pedestrians using the pavement along Balcombe Road; and occupiers of rooms of the Hilton Hotel would not be significant. Such effects would be reduced to some extent through the planting proposed as part of the Project, including enhancement of existing green infrastructure, such as hedgerows, woodland, trees, shrubs, wetland and amenity planting.

2038: Operational Phase

20.2.15 During this period, the effects from the car park at Pentagon Field and on the Gatwick Airport Character Area would remain as reported above and therefore significant. The operational elements of the Project, in conjunction with the mature mitigation adjacent to the High Woodland Fringes, Upper Mole Farmlands, Open Weald and Low Weald landscapes would lead to **negligible adverse** effects in the long term and would not be significant.

20.2.16 By 2038, walkers using public rights of way adjacent to Pentagon Field, and walkers and cyclists using the National Cycle Route 21 through Riverside Garden Park and the adjacent open space would have views of the operational A23 which would result in **moderate to minor adverse** effects which would not be significant. Other receptors, eg members of Gatwick staff; members of the public using the airport access roads and car parks; occupiers of vehicles travelling along the A23; receptors at north facing windows and outdoor spaces of the KFC and McDonalds; occupiers of residential properties on the southern edge of Horley; and pedestrians using the roadside pavement at Balcombe Road, would have views of the operational elements of the Project, resulting in generally **negligible to moderate** effects which would not be significant.

20.2.17 By 2038, other effects would be reduced in significance by the proposed planting and enhancement measures forming part of the Project.

Ecology and Nature Conservation

20.2.18 Chapter 9: Ecology and Nature Conservation assesses the effects of the Project on habitats and species. The Project site was found to largely comprise low value habitats associated with the airport and infrastructure, comprising large areas of hard standing and amenity grassland with areas of ornamental shrub and tree planting. These areas are predominantly located within the centre of the Project site with areas of higher value habitats to the east and west.

20.2.19 The Project includes significant areas of biodiversity enhancement, including:

- creation of a new pond designed to provide a high value habitat for aquatic flora, invertebrates and amphibians within a mitigation area;
- woodland creation and tree and shrub planting;
- diversion of the River Mole to create an increased length of channel with a more natural profile;
- creation of refugia and hibernacula within newly created habitats for great crested newt and grass snake; and
- creation of a south facing mosaic of grassland with occasional scrub to provide suitable habitat for a variety of terrestrial invertebrates and grass snake on the northern bank of the newly diverted section of the River Mole and the area to the north of it.

20.2.20 Effects arising during construction would be controlled through measures set out in the Code of Construction Practice.

Initial Construction Phase: 2024 to 2029

20.2.21 The assessment of effects found that the Project would have no effect on statutory or non-statutory designated sites or areas of ancient woodland at any stage of the Project. The effects on habitats and species were also generally found to be not significant, except where described below.

20.2.22 In terms of effects on habitats, the initial construction phase of the Project would require the removal of species-poor hedgerow and loss of plantation woodland and scrub habitat. The loss of these habitats would result in **moderate adverse** and significant effects. Additional hedgerow planting would be undertaken early in the construction phase on other parts of the Project site, which would enhance habitat connectivity in these areas. This would result in a **moderate beneficial** and significant effect in the longer term.

20.2.23 The above effects on habitats would result in some temporary effects on breeding birds. A loss of suitable breeding sites would result in a **moderate adverse** and significant effect during the initial construction phase. The habitat loss would also result in a temporary **moderate adverse** effect on the bat and invertebrate assemblages. This would be a temporary effect until new tree, grassland and shrub planting had established. Longer term effects would be beneficial, as a result of new planting.

2030 to 2038

20.2.24 The loss of semi-natural broadleaved woodland, broadleaved plantation woodland and mature trees would generate **moderate adverse** temporary significant effects during construction works in the period 2030-2032. This would result in a temporary **moderate adverse** and significant effect on some bat and bird species.

20.2.25 Habitat loss associated with the construction work in these areas would be compensated through planting hedgerows, scattered broadleaved trees and broadleaved woodland and creating neutral grassland throughout the mitigation area to the west of the River Mole corridor to strengthen connectivity and the value of the habitats in that area. Although there would be a temporary loss until new planting has established, the mitigation would reduce the duration of the adverse impact of habitat loss. The mitigation would also provide an enhancement due to new, higher value habitats being present and improved habitat connectivity to the west in addition to the restored river corridor once the River Mole had been diverted.

20.2.26 No other significant effects would arise during the period 2033 to 2038 and no operational effects from 2038 onwards are predicted.

20.2.27 An initial Habitats Regulations Assessment (HRA) has been undertaken to consider the effects on designated sites. There would be no direct habitat loss from any designated site. The HRA does not identify any significant effects on designated sies arising from changes in traffic flows or subsequent changes in air quality. This will be considered in further detail in the Environmental Statement (ES).

20.2.28 No permanent adverse significant effects would arise as a result of the Project. Some minor beneficial permanent effects would arise as a result of habitat creation.

Geology and Ground Conditions

20.2.29 Chapter 10: Geology and Ground Conditions considers the potential impacts from the Project on the underlying aquifers, surface watercourses, human health (construction workers and future site users) and mineral resources.

20.2.30 Effects arising during construction would be controlled through the Code of Construction Practice. This will include measures to facilitate the remediation of areas of existing contamination and measures to prevent runoff and avoid pollution incidents occurring.

Initial Construction Phase: 2024 to 2029

20.2.31 The assessment has considered potential impacts on the underlying aquifers, surface watercourses, human health (construction workers and future site users) and mineral resources.

20.2.32 This phase would involve the relocation of many existing facilities within the Project site. In most cases, the areas where facilities are to be relocated are already occupied by buildings, structures or hard surfacing. Construction activities such as breaking up of paved areas, earthworks etc. would involve exposure of the soils to rain and the movement of machinery which could lead to erosion and compaction, however, these activities would be temporary.

20.2.33 A staged approach is proposed as part of the mitigation strategy to identify the most appropriate course of action for each development area and to target areas where further investigation is required. The scope of the remediation strategy would be agreed with the Environment Agency and Crawley Borough Council prior to its implementation. Validation works would be undertaken on completion of the remediation and a verification report prepared for regulatory sign off.

20.2.34 The significance of effects range from temporary **minor adverse** effects with regard to human health during construction where remediation is required, to **no change**.

2030 to 2038

20.2.35 Ongoing construction works through to 2038 would not result in any significant effects on underlying aquifers, surface watercourses, human health (construction workers and future site users) and mineral resources.

20.2.36 No significant effects would occur during the operational phase from 2038 onwards.

Water Environment

20.2.37 Chapter 11: Water Environment assesses the impact of the Project on the water environment comprising: flood risk and surface water drainage; geomorphology; water quality; groundwater resources; water supply and wastewater infrastructure.

Initial Construction Phase: 2024 to 2029

20.2.38 During the initial construction phase, works would generally be contained within the airfield with some additional activities taking place beyond the current operational airport boundary. The latter includes proposed surface parking at Pentagon Field (previously greenfield), construction of flood mitigation areas and the establishment of construction compounds. Best practice measures to mitigate the construction impacts (implemented through the Code of Construction Practice) would substantially control impacts.

20.2.39 Construction of the diversion of the River Mole would begin in 2024. This would require excavation and earthworks along a 400 metre length in the floodplain adjacent to the existing channel. The existing channel would be infilled along this section, and the upstream and downstream of the diversion channel would be reconnected to the main watercourse. The diversion of the River Mole would have a short-term **minor adverse** but not significant effect on water quality during construction, with longer term beneficial effects due to the naturalisation of the watercourse.

20.2.40 Works would also be undertaken on flood compensation areas at Museum Field, an area east of Museum Field and at car park X. This would require ground lowering to create compensation areas. No significant effects on groundwater or surface water are predicted during this phase, with control measures in place.

20.2.41 Existing surface water flow paths may be interrupted, diverted or created by construction works, due to increased compaction of ground, increase in impermeable area, or by level changes as a result of temporary works. Therefore, any increase in surface water runoff that could potentially not be conveyed by the existing drainage system would be managed on site or dealt with through temporary drainage. The drainage system would be designed to ensure it has adequate capacity to store any additional surface water runoff at all stages of the construction phase. No significant effects on flood risk are likely. Some **minor beneficial** effects (not significant) are predicted as a result of the creation of flood compensation areas, which would reduce flood risk.

First Full Year of Operation: 2029 (up to 2032)

20.2.42 All of the proposed flood mitigation measures (except for the Gatwick Stream flood compensation area) would have been completed by the first full year of opening. After 2029, the main works that could impact on fluvial flood risk would be the proposed surface access improvement works which would include their own mitigation measures.

20.2.43 During this time, there is potential for temporary effects on the watercourses as they adapt and adjust to associated construction works, including the new surface access arrangements at the South Terminal and North Terminal roundabouts. These would not be significant.

20.2.44 Relocation of Pond A could improve the biological quality, and improve habitat functioning, species quality and quantity, as well as water quality indicators. This would result in beneficial effects on the River Mole, which are not considered significant.

Interim Assessment Year: 2032 (up to 2038)

20.2.45 In this phase of the Project, the effects of construction works on the watercourses (undertaken in earlier phases of construction) would have stabilised, and it is not anticipated that there would be any further adverse effects.

20.2.46 The works to create the Gatwick Stream flood compensation area would be undertaken during this period. The works would involve lowering the existing ground level. The flood compensation area would connect to the watercourse by lowering the stream bank. Impacts on the Gatwick Stream could include sediment pollution and a change in bed form over time. However, with the provision of mitigation and best practice measures through the Code of Construction Practice, effects would not be significant.

Design Year: 2038 (Operational Phase)

20.2.47 The following conclusions can be made with regards to flood risk in relation to the Project.

- Fluvial flooding is the principal source of flood risk to the Project. Elements proposed as part of the Project, including new taxiways and stands, would be located as close to existing infrastructure as possible. Therefore, levels of fluvial flood risk to proposed airport infrastructure would be equivalent to existing levels or reduced.
- Surface water flooding is also a significant potential source of flood risk to the Project. However, in most cases surface water flow paths and ponding areas are small in extent and do not encroach on proposed elements of the Project, where they do, surface water drainage will mitigate any risk.
- At this stage, it has not been possible to fully quantify groundwater flood risk to the Project site, however, it is considered that the risk from groundwater flooding at the airport site is low.
- The risk of flooding from other sources, including reservoirs and sewers flooding, is considered medium.

20.2.48 Flood mitigation measures have been proposed as part of the Project, such that the Project would remain safe for its lifetime without increasing flood risk elsewhere. Therefore, the significance of flood risk effects from the Project on all sources of flood risk has been assessed to be (at worst) **negligible or minor adverse** and therefore not significant. For certain receptors, the Project improves fluvial flood risk for third parties.

20.2.49 The diversion of the River Mole has been assessed to have a **minor adverse** effect on water quality. This would be short-term during construction, and the longer term effect is **moderate beneficial** (significant) due to the naturalisation of the watercourse.

20.2.50 From the assessment undertaken of the potential impacts on all elements of the water environment, suitable mitigation has been proposed and it is concluded that there would be no significant effects.

Traffic and Transport

20.2.51 Chapter 12: Traffic and Transport sets out the effects of the Project on the following:

- severance;
- driver delay;
- views from the road;
- pedestrian and cyclist delay and amenity;
- accidents and safety;
- hazardous loads; and
- public transport services and users.

20.2.52 Preliminary traffic modelling shows that highway improvements will be required for the Project to accommodate increased passenger throughput, together with the already consented improvements to Gatwick Station. The proposed highway improvements include changes to the North and South Terminal roundabouts and improvements to the Longbridge Roundabout.

20.2.53 A Travel Plan will target staff travel and encourage more sustainable travel patterns. This will be prepared for the application for development consent. There will also be a Travel Plan for construction workers.

20.2.54 As part of the construction works, a traffic management strategy would be put in place to minimise any negative environmental and community impacts. This would include the following.

- Measures to ensure the transport of construction materials and waste is managed as sustainably as possible, noting the impacts of transporting this by road, including the potential use of rail via facilities close to the airport, where this is appropriate and feasible.
- Scheduling of construction material and logistics traffic movements that need to come by road to use roads and highways outside of peak periods and to use designated routes into construction sites on the airport which are suitable for this type of traffic.
- Delivery Management Zones to consolidate materials onto the least number of vehicles and to hold vehicles away from sensitive areas until deliveries are required.
- Encouraging/incentivising the highest possible public transport use for the construction workforce.
- Timing shift patterns such that those workers who do need to come by road can do so outside of peak periods.

20.2.55 The initial modelling and assessment shows that within the extent of the current traffic model and given the existing high traffic flows on the existing highway network, the Project is not anticipated to generate significant traffic flows beyond the immediate local highway network. However, due to redistribution effects, the strategic modelling work shows that there could be some increases in traffic flows in areas such as Croydon during certain times of day, particular during the interim assessment year 2032.

20.2.56 Based on the methodology, assessment criteria and assignment of significance set out in this chapter, the majority of identified effects would not be significant. However, for a small number of

road links, potentially significant effects on car drivers/passengers (in terms of driver delay) and, in one case, on pedestrians and cyclists (in terms of severance) have been identified. This will be considered further as the EIA process continues and it is anticipated that with further measures in place, long term effects would not be significant.

Air Quality

20.2.57 Chapter 13: Air Quality assesses the impact of the Project upon air quality and odour. The air quality studies are concerned with the presence of airborne pollutants in the atmosphere. The main pollutants of concern for local air quality are oxides of nitrogen (NO_x), including nitrogen dioxide (NO_2), particulate matter (PM_{10} and $PM_{2.5}$) and dust.

20.2.58 Air quality mitigation measures are proposed to ensure best practice is followed for all on-site activities during construction. Measures would be implemented through the Code of Construction Practice. These measures will include the development and implementation of a Dust Management Plan, which may include controlling of other emissions, approved by the local planning authority. Dust suppression measures using water spraying, covering of dusty materials and speed limits on-site will be included.

20.2.59 Low emission plant will be used during construction of the Project elements. The Decade of Change to 2030 document published in 2021 commits to mobile construction equipment meeting zero or ultra-low emission standards by 2030.

20.2.60 Following the implementation of appropriate mitigation, the effects of construction-related activities on dust soiling and human health would be not significant. The mitigation measures are applicable throughout the initial construction phase and until the completion of construction works.

20.2.61 The results of the assessment model show that no significant effects for air quality are anticipated as a result of the Project in any phase.

20.2.62 The air quality assessment includes an ecological assessment of the change in nitrogen dioxide concentrations and change in nitrogen disposition as a result of the Project for all assessment phases at sensitive ecological receptors. No significant effects to ecological receptors from the predicted increase in nitrogen deposition are anticipated as a result of the Project.

Noise and Vibration

20.2.63 Chapter 14: Noise and Vibration assesses the impact of the Project on the following types of noise:

- construction noise and vibration – noise and vibration from temporary construction of the Project, including the use of construction compounds;
- air noise - noise from aircraft in the air or departing or arriving (including reverse thrust) on a runway;
- ground noise – noise generated from airport activities at ground level including aircraft taxiing and traffic within the airport boundary; and
- road traffic noise – noise from road traffic vehicles outside the airport on the public highway.

20.2.64 Construction works would be undertaken in accordance with the Code of Construction Practice which will require contractors to adopt and implement appropriate management measures.

20.2.65 It is proposed that the use of the northern runway would be limited to the period 06:00 to 23:00 hours, avoiding the majority of the more sensitive night-time period. GAL would operate flights from the northern runway using procedures designed to minimise noise impacts, in line with its current processes and the commitments of the Noise Action Plan. GAL would continue to work with communities, the Noise Management Board and its aviation industry stakeholders to develop ways to minimise noise for all operations at the airport.

20.2.66 An enhanced Noise Insulation Scheme is proposed, providing greater coverage than currently offered. Residents in the highest noise Inner Zone would be offered a full package of acoustic insulation to avoid significant adverse effects, with residents in the Outer Zone being offered a lesser package but which would also include acoustic ventilation. In addition, assistance for homeowners looking to move from the most affected properties would also be provided.

20.2.67 GAL proposes a noise envelope that would set limits in terms of the areas affected by specified day and night noise levels (or contours). The identified contours have been chosen because they represent the lowest level of observable adverse effects during the day and night. Limiting noise contour areas are proposed at two points in the future as air traffic increases, with the latter being smaller than the former to ensure noise levels reduce in the longer term.

20.2.68 Mitigation for ground noise from aircraft taxiing and within the airfield has been incorporated into the design of the Project including bunding situated at the western end of northern runway, and noise barriers adjoining the bund installed at the western end of the northern runway.

20.2.69 With regards to noise from road traffic, noise barriers have been incorporated in the eastern side of the new highway to reduce the adverse effect of existing high noise levels in Riverside Garden Park and the surrounding residential area.

Initial Construction Phase: 2024 to 2029

20.2.70 Much of the work on the airfield would be required to be undertaken at night. The initial construction phase noise modelling indicates that there is potential for adverse noise impacts in the communities bordering the airport, and that the scale of those impacts is likely to be larger at night, reflecting the current expectation that much of the work would need to be carried out at night. It is expected that noise mitigation would be identified to reduce noise levels, including quieter methods of working, reducing plant noise levels for night works near sensitive areas, site perimeter noise barriers and receptor-based mitigation where appropriate (noise insulation and temporary rehousing). Based on the available information, and the likely extent of mitigation that would be available, **moderate adverse** effects may arise, which may be considered significant, in some areas. The construction noise assessment will be refined in order to develop further mitigation on site and to estimate the likely extent of the construction noise insulation scheme that would be required.

First Full Year of Opening: 2029

20.2.71 Effects in relation to noise from ongoing construction activities would be in line with those reported above for the initial construction period. Overall, the assessment results indicate that there is potential for adverse noise effects at approximately 150 properties during the day and approximately 500 during the night. A variety of mitigation measures are proposed to reduce the potential construction noise impacts and a noise insulation scheme for construction noise will be developed to avoid significant effects of health and quality of life.

20.2.72 The results of air noise modelling for 2029 indicate that the northern runway is anticipated to add approximately 40 additional movements in the summer daytime period and two additional movements at night. The impacts predicted in 2029 for air noise and ground noise are lower than in those predicted for 2032, are discussed below.

Interim Assessment Year: 2032

20.2.73 Air noise has the potential to affect residents, and other Noise Sensitive Receptors (NSRs) over a wide area beyond the airport boundary. The Project would make alterations to the existing northern runway, resulting in increased use of this runway using the same flight paths. The smaller 'Code C' aircraft (ie <36 metre wingspan) would use the northern runway. Consequently, any noise impacts of the Project would be the result of increases in noise due to the increased number of flights on the northern runway, rather than new noise impacts over areas previously unaffected. This would therefore avoid the noise impacts often associated with new flight paths.

20.2.74 To the west of the western end of the northern runway approximately 40 properties on Ifield Road and near Russ Hill have been identified as experiencing increases of 3-6 dB which are potentially **moderate adverse** significant effects. These houses would be eligible for full noise insulation under the new Inner Zone 1 NIS, to mitigate the potentially significant effects. For all other receptors, increases and decreases in air noise are not predicted to be significant. Noise changes at night would be lower than during the day because it is assumed that the current night noise restriction would continue to cap aircraft numbers and noise in the 23:30 to 06:00 hours period. No other significant effects have been identified.

20.2.75 Ground noise from aircraft taxiing and within the airfield has been modelled at 12 representative receptors. Mitigation has been incorporated into the design of the Project including bunding 8 metres in height situated at the western end of northern runway, and noise barriers 10 metres high adjoining the bund installed at the western end of the northern runway and running for approximately 500 metres just to the north of the relocated Taxiway Juliet. With this mitigation in place, the predicted ground noise impacts are not predicted to be significant (**negligible or minor**) at the majority of these representative receptors with **moderate adverse** effects at three of the 12 receptor areas. The effects rated as **moderate** are considered significant and these are predicted in the Charlwood and Povey Cross areas and the area immediately south of the airport, at a total of approximately 90 properties. These are conservative estimates that will be further refined in the ES.

20.2.76 The remodelling of the Longbridge, North Terminal and South Terminal roundabouts and associated highways works have potential to increase noise levels in the adjacent Riverside Garden Park and residential area. A detailed noise model has been used to predict noise levels and to compare them to the do-minimum in 2032 and 2047 as required by the Design Manual for Roads and Bridges (DMRB) methodology. Noise barriers have been incorporated in the elevated sections of new highway. These would ensure that at most receptors, including within the park, noise levels would reduce as a result of the Project. Further modelling of traffic forecasts will be undertaken and reported in the ES, the numbers of properties affected by the different noise changes will be assessed and is likely to conclude that the benefits are **of negligible or minor significance** in most areas with some moderate significant benefits in small areas where the highest baseline noise levels would be reduced.

2038 and Beyond

20.2.77 No further significant effects are predicted in the later assessment years. This is because fleet transition to quieter new generation aircraft would continue beyond 2038 offsetting the projected increase in air traffic, in all cases.

Climate Change and Carbon

20.2.78 Chapter 15: Climate Change and Carbon assesses the impact of the Project on climate change and carbon. In particular, the chapter assesses the following.

- Climate Change Resilience (CCR): the resilience of the design, construction and operation of the Project to potential climate change impacts.
- In-combination Climate Change Impacts (ICCI): the combined effects of the Project and potential climate change impacts on the receiving environment and community.
- Greenhouse gas (GHG) emissions: the likely effect of the Project in terms of GHG emissions.

20.2.79 The CCR assessment identified several risks as being high or very high during the construction and operation phase. Mitigation for these risks is being developed such that the design would be resilient to climate change. With such measures in place, significant effects are not likely.

20.2.80 No significant effects have been identified thus far through the ICCI assessment for the construction or operational phases.

20.2.81 The GHG assessment has assessed the calculated GHG emissions arising from the Project and confirms that these are significant, in line with guidance which considers all net emissions arising from a project as significant. The GHG emissions arising from aviation form the greatest proportion of overall emissions. Emissions at 2038 from all sources are 7.575 $MtCO_{2e}$ (including all international aviation) compared with a future baseline projection of 6.188 $MtCO_{2e}$ in the absence of the Project. This includes an element of fleet turnover affecting aviation emissions, but no inclusion of more widespread decarbonisation mechanisms such as increased efficiency of engines and use of sustainable aviation fuels.

20.2.82 The Project would incorporate a range of embedded environmental design measures that would contribute positively to mitigation of the GHG emissions associated with the Project. Work to develop mitigation activities remains ongoing, and the impact of these on GHGs will be included in the ES.

20.2.83 The opportunities to mitigate impacts of the Project through both construction and operation will be collated into a draft Carbon and Climate Change Action Plan, to enable the airport to continue to reduce carbon emissions and to deliver sustainable development. The following factors will be considered further:

- the scale of aircraft emissions will be reviewed to take into account the likely evolution and use of sustainable aviation fuels, and to reflect expected gradual transition to electric / hybrid aircraft in use on some domestic and short haul routes;
- more developed data on the design of buildings and infrastructure, and a more informed estimate of the material requirements and waste arisings from the construction of the Project;

- improved information from the strategic transport modelling to inform the assessments of surface access emissions;
- confirmation of the mitigation measures to be implemented and their effect on reducing the emissions arising from the Project including benefits of measures in the Carbon and Climate Change Action Plan currently under preparation; and
- any changes to UK carbon budgets resulting from the revision to the Climate Change Act.

20.2.84 The next steps will include close working with the Project design teams to confirm the adoption of mitigation measures through design of the airport facilities and highways infrastructure, optimisation of material sourcing and recycling of cut/fill materials, management of construction stage emissions and the adoption of the energy strategy to reduce emissions arising from airport operations. The opportunities to mitigate impacts of the Project through both construction and operation will be collated into the draft Carbon and Climate Change Action Plan, to be published as part of the application for development consent.

Socio-economic Effects

20.2.85 Chapter 16: Socio-economics considers the potential socio-economic effects of the Project during the construction and operational phases. The assessment considers a broad range of effects including:

- employment;
- supply chains;
- labour markets;
- business disruption;
- business displacement;
- population;
- housing;
- resident disruption;
- community facilities and services;
- community cohesion; and
- compensation.

20.2.86 The Project will include the adoption of an Outline Employment, Skills and Business Strategy to continue and expand activities undertaken by GAL to support career entry (for graduates and apprenticeships), training and other work opportunities, together with the adoption of a Business Support Strategy to link Gatwick Airport with providers in the supply chain and through local procurement initiatives. These measures will enhance the potential employment and labour market impacts of the Project.

20.2.87 Some significant effects have been identified including beneficial effects through the generation of construction and operational employment across the four different phases of this socio-economic assessment. In particular, within the local study area the Project has been assessed to have a **moderate to major beneficial** effect that would be significant for construction employment 2024-29; **moderate beneficial** effect at 2029 first year of opening; a **moderate beneficial** effect at 2032 and also at 2038.

20.2.88 There would also be a **moderate beneficial** effect on supply chain employment opportunities at 2029 opening year and **moderate to major beneficial** at 2032 and 2038. Some of these effects

will be subject to further enhancement and mitigation measures which will be outlined in further detail at the ES stage.

20.2.89 The Project is expected to generate some disruption to business and residents (eg through changes to traffic and noise levels) and this would be a **moderate adverse** effect that would be significant. The Project is not expected to increase the need for housing above what is already planned for by neighbouring local authorities.

20.2.90 There would be a loss of Open Space (ie less than one hectare of open space) at Riverside Garden Park comprising a **moderate adverse** effect. Measures including re-provision of the entire loss and further enhancements to the rest of the open space provision are expected to mitigate the effect. Finally, there are **moderate adverse** effects on the labour market in the local study area identified in the interim assessment 2032 and 2038 design year. These effects will be mitigated by the Outline Employment, Skills and Business Strategy.

Health and Wellbeing

20.2.91 Chapter 17: Health and Wellbeing considers the effects of the Project on health and wellbeing and draws from other technical assessments (most notably: Chapter 12: Traffic and Transport; Chapter 13: Air Quality; Chapter 14: Noise and Vibration; and Chapter 16: Socio-economics).

Initial Construction Phase: 2024 to 2029

20.2.92 Overall, no significant health and wellbeing effects (adverse or beneficial) have been identified during the initial construction phase for the range of determinants assessed. Potential health and wellbeing effects from changes in environmental health determinants assessed (ie air quality and transport nature/flow rate) are considered to be **minor adverse** on the basis that impacts would generally be temporary, intermittent and managed through the implementation of best practice construction methods. In addition, health and wellbeing effects from changes in exposure to temporary lighting have been explored, but predicted to have no change, on the basis that no residential receptors would be impacted.

2029-3038

20.2.93 In terms of wider determinants, beneficial health and wellbeing effects have been predicted for changes in lifestyle factors and socio-economic factors during the initial construction phase (ie employment) due to job creation. In addition, impacts on healthcare capacity due to the influx of a non-home-based workforce is intended to be managed internally to ensure that any effect is not significant. The first full year of opening (2029) and the interim assessment year (2032) would include a combination of construction and operation-related health and wellbeing effects. However, health and wellbeing effects associated with environmental determinants (ie air quality, noise and transport) would remain not significant. Similarly, there would be no significant change in exposure to temporary or permanent lighting for residential receptors. Health and wellbeing effects from changes in lifestyle factors would remain **minor beneficial** and not significant in both assessment scenarios.

20.2.94 Health and wellbeing effects from changes in socio-economic factors (ie employment) would increase from **minor beneficial** in the first full year of opening (2029) to **moderate beneficial** in the interim assessment year (2032), which is considered significant. This is primarily due to the magnitude of indirect and induced job opportunities expected to be provided.

20.2.95 In terms of health and wellbeing effects from changes in healthcare capacity, a number of elements have been assessed (relating to construction and operation), which comprise the increase in demand for local health care services due to the influx of a non-home-based construction workforce, or from emergency call outs associated with increased passenger throughput. Overall, the effect on health and wellbeing is not considered significant, on the basis that any potential increase in demand is intended to be managed internally.

Design Year: 2038 (Operational Phase)

20.2.96 The design year (2038) is an operation only scenario. Health and wellbeing effects associated with environmental determinants would remain not significant. Operational employment opportunities (direct, indirect and induced) would reach their peak and continue to have **moderate beneficial** health and wellbeing effects, which are considered to be significant. There would no longer be a construction workforce, so any changes to healthcare capacity would be limited to emergency call outs associated with increased passenger throughput, which would not be significant on the basis that any change is intended to be managed internally.

Agricultural Land Use and Recreation

20.2.97 Chapter 18: Agriculture and Land Use considers the potential effects of the Project on agricultural land use and recreational resources, including areas of public open space, public rights of way and other linear recreational routes during its construction and operational phases.

20.2.98 The Project includes a range of mitigation measures, including replacement open space and provision of a new recreational route around the environmental enhancement area at Museum Field.

Initial Construction Phase: 2024 to 2029

20.2.99 During the initial construction phase of the Project there would be temporary effects associated with the loss (approximately 3.3 hectares) of lower quality agricultural land and permanent effects associated with land take (approximately 13.2 hectares) required for the development of surface parking on Pentagon Field, the provision of the Museum Field flood compensation area and a strip of land north of the existing South Terminal roundabout. In this instance, for both temporary and permanent land take, this is not considered to be significant, as no best and most versatile land resource (Grades 1, 2 or 3a land) is affected. Also associated with the temporary works at South Terminal roundabout, there would also be temporary disruption to a single holding which is let on a short term arrangement for horse grazing and hay production. The long term temporary effect of the loss of this single holding would not be significant.

20.2.100 There would also be permanent loss of agricultural land from seven land holdings during this stage. These losses would have effects on three holdings where land is being used for agricultural production, but these enterprises would still be able to continue to operate.

20.2.101 The overall significance of effect arising from the permanent loss of these areas of agricultural grassland from these holdings would not be significant.

20.2.102 In terms of effects on recreation, during the initial construction phase, there is the potential for access disruption along the Sussex Border Path and a number of public footpaths as a result of the commencement of the new grade separated junction to serve the South Terminal and construction activities at Pentagon Field. Public access improvements are proposed to mitigate

these effects, including the provision of new circular recreational route around the east of Museum Field flood compensation. Taking all these factors into account, the temporary effect on public rights of way during construction is assessed to be of **minor adverse** significance (not significant) and the overall effect on recreational routes and facilities during operation is assessed to be of permanent **minor beneficial** significance (not significant).

20.2.103 The improvement works associated with the proposed new grade separated junction to serve the North Terminal may encroach into the southern fringe of Riverside Garden Park. This would result in potential permanent loss of approximately 0.75 hectares of public open space within these areas and would impact on a section of the Sussex Border Path to the south of the A23. There would be no change to the alignment of National Cycle Route (NCR)21 within the south eastern corner of Riverside Garden Park and under the existing A23 during the construction works. However, there is the potential for some changes to the amenity of the route in this location.

20.2.104 To mitigate for these impacts the following measures have been incorporated into the Project design.

- New areas of public open space would be created totalling a minimum of 0.75 hectares (or an area equivalent to the total loss of public open space), with links to the existing area of Riverside Garden Park, St Bartholomew's Church and the former Horley Anderson Centre and Playing Fields, and the residential areas of Horley to the north and east.
- It is also proposed to make a commitment towards improvements/enhancements within Riverside Garden Park in consultation with Reigate and Banstead Borough Council.
- Provision of a permanent diversion to the Sussex Border Path to the south of the A23 arising from the new North Terminal roundabout.
- Provision of a pedestrian link between the footway on the northern side of the A23 footway near the Longbridge Roundabout into Riverside Garden Park.
- Provision of an additional pedestrian route linking Riverside Garden Park with the Sussex Border Path to the north of the A23.

20.2.105 Taking these factors into account, the effect on the areas of public open space in Riverside Garden Park, is assessed to be of long term **moderate adverse** that would be significant; and the effect on the Sussex Border Path is assessed to be of permanent **minor beneficial** significance.

Ongoing Construction and Operation: 2030 to 2032

20.2.106 The North and South Terminal junction improvements which would commence towards the end of the initial construction phase, are anticipated to be completed by 2032. Works to the Longbridge Roundabout are anticipated to take place between 2030 and 2032. These would impact approximately 0.1 hectares on the southern part of areas of public open space (St Bartholomew's Church and the former Horley Anderson Centre and Playing Fields) to the north of the A23 and east of the River Mole.

20.2.107 To mitigate for these impacts the following measures have been incorporated into the Project design, in addition to those identified above.

- New areas of public open space would be created totalling a minimum of 0.1 hectares (or an area equivalent to the total loss of public open space), with links to the existing area of

Riverside Garden Park, St Bartholomew's Church and the former Horley Anderson Centre and Playing Fields, and the residential areas of Horley to the north and east.

20.2.108 Taking these factors into account, the effect on these areas of public open space would not be significant.

Ongoing Construction and Operation: 2033 to 2038

20.2.109 No further effects on recreational resources are anticipated as a result of the ongoing construction and operation of the project in the period 2033-2038

Design Year: 2038 (Operational Phase)

20.2.110 No further effects on recreational resources are anticipated as a result of the operation of the Project in the design year 2038.

Table 20.2.1: Summary of Significant Effects Identified in the PEIR

Topic	Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Notes
Construction Phase (2024 – 2029)							
Historic Environment	Buried archaeological remains (surface access works contractor compound – South Terminal roundabout – land north of the M23 motorway spur)	Up to Medium	Potential loss or damage to remains from establishment of compound	Permanent	Up to High	Up to Major Adverse	Date, nature and extent of any buried archaeological remains not yet ascertained. Proposed programme of archaeological investigation should establish receptor sensitivity. Appropriate mitigation may be implemented during establishment of compound and this would reduce the magnitude of impact. If this is not possible then the effect could be offset through a programme of archaeological investigation.
	Buried archaeological remains (ground lowering – Museum Field)	Up to Medium	Complete loss or substantial damage resulting from reduction in ground level	Permanent	Up to High	Up to Major Adverse	Date, nature and extent of any buried archaeological remains not yet ascertained. Effect offset through programme of archaeological investigation.
	Deposits of geoarchaeological interest (flood	Low	Complete loss or substantial damage resulting from ground reduction	Permanent	Up to High	Up to Major Adverse	

Topic	Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Notes
	alleviation – car park X)						
	Buried archaeological remains (Pentagon Field)	Up to Medium	Loss of or damage resulting from placement of spoil and construction of the decked car park	Permanent	Up to High	Up to Major Adverse	
	Buried archaeological remains (environmental mitigation land surrounding Museum Field)	Up to medium	Planting, scrapes, replacement habitats etc	Permanent	High	Up to Major Adverse	Date, nature and extent of any buried archaeological remains not yet ascertained. Proposed programme of archaeological investigation should establish receptor sensitivity. Appropriate mitigation may be implemented during establishment of compound. and this would reduce the magnitude of impact. If this is not possible then the effect could be offset through a programme of archaeological investigation.
	Buried archaeological remains (replacement 'Purple Parking' at	Low	Complete loss or substantial damage resulting from construction of surface car park	Permanent	High	Up to Moderate Adverse	Date, nature and extent of any buried archaeological remains not yet ascertained. Effect offset through programme of archaeological investigation.

Topic	Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Notes
	western end of Crawter's Field)						
	Deposits of geoarchaeological interest (relocation of Pond A and River Mole Diversion)	Up to Medium	Complete loss or substantial damage resulting from construction of River Mole Diversion	Permanent	Medium	Moderate Adverse	
Landscape, Townscape and Visual Resources	Gatwick Airport Urban Character Area	Low generally, Medium at Pentagon Field.	Loss of Pentagon Field grazing land for spoil placement and construction of decked parking. Construction phase impact on townscape character generally.	Medium term, temporary and long term permanent	High to Medium	Major to Minor Adverse	Effects are only significant at Pentagon Field, which is a green field site and more sensitive to large scale change than other parts of Gatwick.
	Walkers using Public right of way 359/Sy at Pentagon Field	High	Visual, construction / operation of decked car park	Medium term, temporary and long term permanent	Medium	Major adverse	
	Pedestrians on Balcombe Road	Medium	Visual, construction/ operational phase	Medium term, temporary and long term, permanent	High	Moderate to Major adverse	

Topic	Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Notes
Ecology and Nature Conservation	Hedgerows	County	Loss of species-poor hedgerow to South Terminal roundabout improvements	Medium term	Medium	Moderate adverse	
			Reconfiguration of airport facilities	Long term	Medium	Moderate beneficial	
	Broadleaved plantation woodland and associated scrub	Local	Loss of woodland and scrub and loss of habitat connectivity	Long-term	High	Moderate Adverse	New woodland planting would result in long term beneficial effects.
	Breeding bird assemblage including species of conservation interest (confirmed or possible)	County (other/Reed Bunting)	Loss of suitable nesting sites for a range of species	Long-term	Medium	Moderate Adverse	
	Assemblage of other bat species	Local	Construction of Surface access satellite contractor compound, South Terminal and North and South Terminal improvement works	Long-term	High	Moderate Adverse	

Topic	Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Notes
	Terrestrial Invertebrate Assemblage	County	Habitat loss	Medium term	Medium	Moderate adverse	
Traffic and Transport	Car drivers and passengers	Low to Medium	Driver delay	Medium term	No Change to Medium	Moderate Adverse for two Croydon junctions	Further work and mitigation measures will be considered, and the residual effect is expected to be not significant
Noise and Vibration	Construction Noise	Residential (High) Non-Residential (various)	Construction noise	Short term	Medium	Moderate (subject to further assessment)	Further assessment to be undertaken.
Climate Change and Carbon	GHG	N/A	Emission of GHGs	Long term	N/A	Significant	IEMA guidance (IEMA, 2017) indicates that all emissions of GHG are significant
Socio-economics	Employment (local study area)	Medium	Direct construction employment	Medium-term	High beneficial	Moderate to major beneficial	
Agriculture and recreation	Riverside Garden Park		Loss of approx. 0.75 hectares of public open space and provision of replacement land	Long term	Medium	Moderate adverse	

Topic	Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Notes
2030-2032 (Construction and Operational Effects)							
Historic Environment	Buried archaeological remains (surface access works contractor compound – Longbridge Roundabout)	Up to High	Potential loss or damage to remains from establishment of compound	Permanent	Up to High	Up to Major Adverse	Date, nature and extent of any buried archaeological remains not yet ascertained. Proposed programme of archaeological investigation should establish receptor sensitivity. Appropriate mitigation may be implemented during establishment of compound and this would reduce the magnitude of impact. If this is not possible then the effect could be offset through a programme of archaeological investigation.
	Buried archaeological remains (Car Park B north of A27 Airport Way)	Up to High	Potential loss or damage to remains from environmental mitigation	Permanent	Up to High	Up to Major Adverse	Date, nature and extent of any buried archaeological remains not yet ascertained. Appropriate mitigation may be implemented ahead of the environmental mitigation works and this would reduce the magnitude of impact. If this is not possible then the effect could be offset through a programme of archaeological investigation.

Topic	Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Notes
Landscape, Townscape and Visual Resources	Gatwick Airport Urban Character Area	Medium at Pentagon Field, Low generally	Loss of Pentagon Field grazing land to decked parking. Construction and operational phase impacts on townscape character generally.	Short to Medium term, temporary and long term permanent	Medium (overall) High (Pentagon Field)	Minor adverse (overall) Major adverse (Pentagon Field)	Effects are only significant at Pentagon Field, which is a green field site and more sensitive to large scale change than other parts of Gatwick.
	Occupiers of Hilton Hotel	Medium	Visual, construction phase	Medium term, temporary and long term permanent	High	Moderate to major adverse	
	Walkers using Public right of way 359/Sy at Pentagon Field	High	Visual, operation of decked car park	Long term permanent	Medium	Major adverse	
	Pedestrians on Balcombe Road	Medium	Visual, construction phase	Long term, permanent	High	Major adverse	
Ecology and Nature Conservation	Semi-natural broadleaved woodland and individual broadleaved trees	County (Riverside Garden Park)	Loss of woodland in combination with loss from the South and North Terminal improvements	Long term	Medium	Moderate adverse	The Project currently proposes a significant loss of woodland that is partially mitigated for at a later date. The combined effect on habitat connectivity is significant.

Topic	Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Notes
	Breeding birds (NERC Species of Principal Importance and BoCC Red or Amber listed species)	County	Loss of suitable nesting sites for a range of species	Medium term	Medium	Moderate adverse	There would be an additional loss of nesting sites between habitats being lost and new habitats being sufficiently established to provide alternative nest sites. The long term effects would be beneficial.
	Assemblage of Bat Species	County	Loss of semi-natural broadleaved woodland due to Longbridge roundabout improvements	Long term	High	Moderate adverse	Some woodland, broadleaved trees, hedgerow and scrub would be lost along the A23 London Road and Riverside Garden Park. New woodland would be planted, but this will take time to become established. The long term effects would be beneficial.
Traffic and Transport (assessed for 2029)	Car drivers and passengers	Low to Medium	Driver delay	Medium term	No Change to Medium	Moderate Adverse for four Croydon junction.	Further work and mitigation measures will be considered, and the residual effect is expected to be not significant.
Climate Change and Carbon	GHG	N/A	Emission of GHGs	Long term	N/A	Significant	IEMA guidance (IEMA, 2017) indicates that all emissions of GHG are significant.

Topic	Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Notes
Socio-economics (Construction Phase 2029 – 2032)	Employment (local study area)	Medium	Direct construction employment	Short-term	Medium beneficial	Moderate beneficial	
	Open Space – Riverside Garden Park (Project site boundary)	High	Loss of Open Space	Permanent	Medium adverse	Moderate Adverse	
Socio-economics (Operational Phase 2029)	Supply chain (local study area)	Medium	Introduction of new indirect and catalytic jobs and GVA	Permanent	Medium beneficial	Moderate beneficial	
2033-2038 (Construction and Operational Effects)							
Historic Environment	Buried archaeological remains (Flood Compensation Area east of Gatwick Stream)	Up to Medium	Complete loss or substantial damage resulting from ground reduction	Permanent	High	Up to Major Adverse	Date, nature and extent of any buried archaeological remains not yet ascertained. Effect offset through programme of archaeological investigation.
Landscape, Townscape and Visual Resources	Gatwick Airport Urban Character Area	Low generally Medium at Pentagon Field	Loss of Pentagon Field grazing land to decked parking. Construction and operation phase impacts on townscape character generally.	Short/Medium/ long term, temporary/ permanent	Medium (overall) High (Pentagon Field)	Minor adverse (overall) Major adverse	Effects are only significant at Pentagon Field, which is a green field site and more sensitive to large scale change than other parts of Gatwick.

Topic	Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Notes
						(Pentagon Field)	
Traffic and Transport (assessed for 2032)	Pedestrians and cyclists	Negligible to Medium	Severance	Long term	Low to High	Moderate Adverse for three links in Croydon.	Further work and mitigation measures will be considered, and the residual effect is expected to be not significant
	Car drivers and passengers	Negligible to Medium	Driver delay	Long term	No Change to Medium	Moderate Adverse for eight junctions.	Further work and mitigation measures will be considered, and the residual effect is expected to be not significant
Noise and Vibration (assessed for 2032)	West of runway Ifield Road, Russ Hill	Residential (high) and non-residential (various) noise sensitive receptors	Air noise disturbance	Permanent	Day 40 homes: medium to high. Night 60 homes: medium to high. Approximately 80 homes above SOAEL due to Project.	Moderate adverse	All homes eligible for Inner Zone NIS to avoid significant effects

Topic	Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Notes
	Properties in Charlwood and Povey Cross areas and the area immediately south of the airport	Residential (high) and non-residential (various) noise sensitive receptors	Ground noise disturbance	Permanent	Approximately 90 properties (conservative estimate to be refined)	Moderate adverse, subject to further study	Noise bund and barrier minimises impacts to below SOAEL.
	Area immediately south of the airport	Residential (high)	Ground noise disturbance	Permanent	Approximately 10 properties	Moderate adverse, subject to further study	The Inner Zone NIS will be offered to mitigate significant effects (above SOAEL) predicted at approximately 10 properties in the Myrtle Cottage area.
	Properties within LOAEL road traffic noise contours	Residential (high) and non-residential (various) noise sensitive receptors	Road traffic noise disturbance from roads modified by the Project	Permanent	Negligible to low/medium beneficial	Not significant/ significant beneficial	Includes noise barriers
Climate Change and Carbon	GHG	N/A	Emission of GHGs	Long term	N/A	Significant	IEMA guidance (IEMA, 2017) indicates that all emissions of GHG are significant.

Topic	Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Notes
Socio-economics (Construction Phase 2032 – 2037)	Businesses (Project site boundary)	High	Driver delays – Business disruptions	Medium-term	Medium Adverse	Moderate adverse	
Socio-economics (Operational Phase 2032)	Employment (local study area)	Medium	Introduction of new permanent direct jobs and GVA	Permanent	Medium beneficial	Moderate beneficial	
	Supply chain (local study area)	Medium	Introduction of new indirect and catalytic jobs and GVA	Permanent	High beneficial	Moderate to major beneficial	
	Labour Market (local study area)	Medium	Demand for labour, new training opportunities and improved access to work	Permanent	Medium adverse	Moderate adverse	
	Businesses (Project site boundary)	High	Business disruption - Driver delays	Permanent	Low to medium adverse	Moderate adverse	
Health and Wellbeing	Health and wellbeing effects from changes in socio-economic factors	High	Increase in direct, indirect and induced employment opportunities	Medium term, temporary (construction)/long term, permanent (operational)	Medium	Moderate beneficial	

Topic	Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Notes
Design year (2038)							
Landscape, Townscape and Visual Resources	Medium at Pentagon Field, Low generally	Loss of Pentagon Field grazing land for decked parking. Operational phase impacts on townscape character generally.	Long term, permanent	Medium (overall) High (Pentagon Field)	Medium at Pentagon Field, Low generally	Minor adverse (overall) Major adverse (Pentagon Field)	Effects are only significant at Pentagon Field, which is a green field site and more sensitive to large scale change than other parts of Gatwick.
Water Environment	Surface Water - Water Quality and Geomorphology	High	River Mole diversion, including re-meandering and restoration of natural channel morphology, improved floodplain coupling	Long-term	Medium	Moderate Beneficial	
	Flood Risk – Fluvial (on Airport)	Very High to Low	Change in flood risk due to encroachment into floodplain	Long-term	Medium to No Change	Major Beneficial	Potential impact on flood risk is long-term, however, if the risk is realised,

Topic	Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Notes
						to Minor Adverse	the flooding would be a short-term event. Small extent of increase at Fire training Ground
	Flood Risk – Fluvial (offsite)	Very High (Transport Infrastructure) to Medium (Industrial)	Change in flood risk due to encroachment into floodplain	Long-term	Medium to No Change	Major Beneficial to No Change	Potential impact on flood risk is long-term, however, if the risk is realised, the flooding would be a short-term event. Third party receptors would experience lower flood depths for the design event.
Traffic and transport (assessed for 2047)	Car drivers and passengers	Low to Medium	Driver delay	Permanent	No Change to Medium	Moderate Adverse for thirteen junctions.	Further work and mitigation measures will be considered, and the residual effect is expected to be not significant.
Climate Change and Carbon	Climate	N/A	Emission of GHGs	Long term	N/A	Significant	IEMA guidance (IEMA, 2017) indicates that all emissions of GHG are significant.
Socio-economics	Employment (local study area)	Medium	Introduction of new permanent direct jobs and GVA	Permanent	Medium beneficial	Moderate beneficial	
	Supply chain (local study area)	Medium	Introduction of new indirect and catalytic jobs and GVA	Permanent	High beneficial	Moderate to major beneficial	

Topic	Receptor	Receptor Sensitivity	Description of Impact	Short / medium / long term / permanent	Magnitude of Impact	Significance of Effect	Notes
	Labour market (local study area)	Medium	Demand for labour, new training opportunities and improved access to work	Permanent	Medium adverse	Moderate adverse	
Health and Wellbeing	Health and wellbeing effects from changes in socio-economic factors	High	Increase in direct, indirect and induced employment opportunities	Long term, permanent	Medium	Moderate beneficial	

20.3. References

Institute of Environmental Management and Assessment (2017) The Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance.

20.4. Glossary

Table 20.4.1: Glossary of Terms

Term	Description
CCR	Climate Change Resilience
CoCP	Code of Construction Practice
EIA	Environmental Impact Assessment
GHG	Greenhouse Gas
GVA	Gross Value Added
ICCI	In-combination Climate Change Impacts
IEMA	Institute of Environmental Management and Assessment
MSCP	Multi-storey car park
NSR	Noise Sensitive Receptors
PEIR	Preliminary Environmental Information Report