Gatwick Airport Northern Runway Project

Environmental Statement
Chapter 13: Air Quality - Tracked Version

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13.1. Introduction

13.1.1 This chapter of the Environmental Statement (ES) presents the findings of the Environmental Impact Assessment (EIA) concerning the potential effects of the proposal to make best use of Gatwick Airport's existing runways and infrastructure (referred to within this report as 'the Project') on air quality and odour.

13.1.2 The key issues considered in this assessment are set out in Table 13.4.1. In summary, the following matters have been assessed and the findings reported in this ES chapter:

- dust, odour and particulate matter (PM_{10}) emissions arising from demolition, earthworks and construction works;
- changes to emissions associated with construction related equipment (non-road mobile machinery (NRMM);
- changes to emissions from vehicle journeys as a result of construction activity;
- changes to emissions as a result of staff and passenger vehicle journeys to and from the airport on the road network;
- changes to emissions as a result of car park provisions;
- changes to emissions from the Central Area Recycling Enclosure (CARE) facility;
- changes to emissions from aircraft engines;
- changes to emissions from vehicles and mobile equipment operating at the airport;
- changes to emissions from combustion plant operating at the airport;
- miscellaneous emissions from other airport activities, such as fire training and engine testing; and
- qualitative odour assessment of operational scenarios.

13.1.3 The Preliminary Environmental Information Report (PEIR) Chapter 13: Air Quality identified a number of next steps to be addressed in the ES and these have been addressed in this ES chapter as follows:

- Contour mapping of pollutant concentrations has been undertaken, and the results are presented in Figures 13.1.1 to 13.1.9.
- Any changes to road traffic data, following updates made by the transport team, have been reviewed and the modelled study area updated accordingly.
- Consultation has been undertaken with stakeholders and amendments to the method have been agreed and incorporated into the ES. Further detail of the consultation is provided in Section 13.3.
- Potential impacts from odour were reviewed and the assessment of odour risk is included in Section 13.10.

13.2. Legislation and Policy

13.2.1 This section identifies the key legislation and policy relevant to the scope and methodology for the air quality assessment which may influence the type of mitigation measures that could be incorporated into the Project during construction and/or operation.

Legislation

Table 13.2.1: Air Quality Legislation

Legislation	How/Where Taken into Account in ES
Air Quality (England) Regulations 2000 (UK Government, 2000) and Air Quality Standards Regulations 2010 (amended in 2016) (UK Government, 2016). Prior to UK's withdrawal from the European Union (EU), the following three EU directives were transposed into national legislation in England by the Air Quality (England) Regulations 2000 (UK Government, 2000) and the Air Quality Standards Regulations 2010 (amended in 2016) (UK Government, 2016): ▪ Air Quality Framework Directive on ambient air quality assessment and management (96/62/EC) (European Parliament, 1996) which defines the policy framework for 12 air pollutants; ▪ Daughter Directives, including Directive 1999/30/EC (the 1st Daughter Directive) (European Parliament, 1999); ▪ and Directive 2008/50/EC on ambient air quality and cleaner air for Europe (European Parliament, 2008). The Air Quality Framework Directive set the standards for pollutants known to have harmful effects to human health and the environment and set limit values and timescales for their achievement. In particular, limit values for each specified pollutant were set through a series in the above Directives: Directive 1999/30/EC (European Parliament, 1999) relates to nitrogen dioxide (NO_2), oxides of nitrogen (NOx) and particulate matter (amongst other pollutants), Directive 2000/69/EC (European Parliament, 2000) relates to benzene and carbon monoxide, Directive 2002/3/EC (European Parliament, 2002) for ozone, Directive 2004/107/EC (European Parliament, 2004) relates to toxic heavy metals and polycyclic aromatic hydrocarbons, and Directive 2008/50/EC (European Parliament, 2008) relates to NO_2, NOx, particulate matter, sulphur dioxide, lead, benzene and carbon monoxide.	This legislation for England remains in force and sets the requirements that the Secretary of State (SoS) for the Environment has for air quality, which is ensuring compliance with the air quality limit values. These limit values, referred to as 'standards' hereafter, have been provided in Table 13.2.2 and used in the assessment.
Air Quality (Amendment of Domestic Regulations) (EU Exit) Regulations 2019 (UK Government, 2019)	This legislation for England ensures the above EU-derived legislation remains in force. These

Legislation	How/Where Taken into Account in ES
This regulation makes amendments to retained EU-derived domestic legislation with regard to air quality to ensure air quality management would continue via this statutory instrument.	standards have been provided in Table 13.2.2 and used in the assessment.
Environment Act 2021 (UK Government, 2021) Part IV of the Environment Act 2021 places a duty on the SoS for the Environment to develop, implement and maintain an air quality strategy with the aim of reducing atmospheric emissions and improving air quality. The Clean Air Strategy (presented in Table 13.2.3) provides this framework. This includes the statutory duty for local authorities to undergo a process of local air quality management and declare Air Quality Management Areas (AQMAs) where necessary.	The impact at the AQMAs is discussed in Section 13.7 and have been assessed with the results presented in Section 13.10. Maximum NO_2 concentrations at AQMAs are summarised and presented in **ES Appendix 13.9.1: Air Quality Results Tables and Figures P4-6**. (Doc Ref.5.3)
Environment Act 2021 (UK Government, 2021) The Environment Act 2021 requires the Secretary of State to set a long-term target (15-year minimum) for air quality, and a target (no mandate on length) for the annual amount of $PM_{2.5}$ in the air. The government published the targets on 16 December 2022 with an Environmental Improvement Plan provided in 2023 which sets interim targets. It also requires Local Authorities to produce an action plan to ensure standards are met for air quality management areas. The Act requires the National Air Quality Strategy to be reviewed at least every 5 years (Defra, 2023b).	This assessment considers current legislated limits in the Air Quality Standard Regulations. However, the aspirations of the Act are considered in the mitigation in Section 13.9. The mitigation looks to reduce impacts, even at locations where the limits are not predicted to be exceeded. The impact at the AQMAs is discussed in Section 13.7 and have been assessed with the results presented in Section 13.10. Maximum NO_2 concentrations at AQMAs are summarized and presented in **ES Appendix 13.9.1: Air Quality Results Tables and Figures P4-6** (Doc Ref.5.3). Local authority action plans are considered in the Local Planning Policy section of this ES Chapter (Section 13.2)
National Emissions Ceilings Regulations 2018 (UK Government, 2018) In December 2016, Directive 2016/2284/EU (European Parliament, 2008) on the reduction of national emissions of certain atmospheric pollutants came into force (the National Emissions Ceiling 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	The emissions of NO_x and $PM_{2.5}$ related to the Project have been calculated using the methodology in **ES Appendix 13.4.1: Air Quality Assessment Methodolo**gy (Doc Ref.5.3). A summary of impacts from the emissions calculated has been provided in Section 13.10. The legislation sets UK wide targets hence 'ceilings' are not relevant to the project. The Project has taken into account the related principles of reducing emissions where

Legislation	How/Where Taken into Account in ES
national legislation in England by the National Emission Ceiling Regulations 2018. The legislation sets national (UK wide) emission limits or 'ceilings' for sulphur dioxide, NO_x, ammonia non-methane volatile organic compounds in 2010, 2020 and 2030 and for $PM_{2.5}$ in 2020 and 2030.	feasible in the mitigation outlined in Section 13.9.
Environmental Improvement Plan 2023 (Defra, 2023a) The Environmental Improvement Plan (EIP) was published in 2023 by Defra and aims to address air, water, and land pollution, setting new targets to improve the environment and people's health and quality of life. The document represents the first review of the 25 Year Environment Plan. Actions in the document set out for clean air including cutting overall air pollution by tackling key sources of emissions, such as domestic burning appliances in Smoke Control Areas, tackling specific hotspots by challenging councils to improve air quality and reducing ammonia emissions by using farming incentives, investing in slurry storage infrastructure and considering expanding environmental permitting.	The EIP set standards for $PM_{2.5}$ which have been provided in Table 13.2.2 and used in the assessment.
Clean Air Bill (Private Members' Bill, 2022) The Clean Air (Human Rights) Bill is currently going through scrutiny in the UK Parliament and is at the second reading of the Bill in the House of Commons. The Bill would (amongst other things) require the SoS to achieve and maintain clean air in England and Wales; would involve the UK Health Security Agency in setting and reviewing pollutants and their limits; and would enhance the powers, duties and functions of various agencies and authorities in relation to air pollution.	The Bill does not represent current law for planning purposes. However, the aspirations of the Bill are considered in the mitigation provided in Section 13.9. The mitigation looks to reduce impacts, even at locations where the limits are not predicted to be exceeded.
Sulphur Content of Liquid Fuels Regulations (UK Government, 2014) These regulations amend the Sulphur Content of Liquid Fuels (England and Wales) Regulations 2007 (SI 2007/79) to implement matters concerning heavy fuel oil and gas oil (except marine fuel) in Directive 1999/32/EC relating to a reduction in the sulphur content of certain liquid fuels. The regulation limits the sulphur content in	Sulphur emissions from road vehicles are not a concern for local air quality in this assessment due to stringent legislation on liquid fuels included in the Sulphur Content of Liquid Fuels Regulations 2014, which has reduced SO_2 emissions from gas oil and diesel fuel.

Legislation	How/Where Taken into Account in ES
gas oil to 0.1% by mass and in heavy fuel oil to 1% by mass.	
The Environmental Targets (Fine Particulate Matter) (England) (UK Government, 2023) The Environmental Targets sets two new targets for fine particulate matter ($PM_{2.5}$): • a maximum annual mean concentration target of 10 µg/m3 to be achieved by 2040; and • a population exposure reduction target of 35% compared to 2018 to be achieved by 2040. Legal compliance with the targets will be monitored using the national monitoring network as set out in the Regulations, although local monitoring and modelling remain useful indicators of local concentrations. The air quality strategy provides a framework for local authority action (Defra, 2023b).	The targets have been provided in Table 13.2.2 and used in the assessment.

Air Quality Standards

13.2.2 Table 13.2.2 sets out the air quality standards for the pollutants of most relevance to this assessment for the protection of human health and ecosystems, obtained from the Air Quality Standards Regulations 2010 (amended in 2016) (UK Government, 2016). Nitrogen dioxide (NO_2), particulate matter (PM_{10} and $PM_{2.5}$), carbon monoxide (CO), sulphur dioxide (SO_2) and Volatile Organic Compounds (VOCs) are considered for the protection of human health. Nitrogen oxides (NO_x), sulphur dioxide (SO_2) and ammonia (NH_3) are considered for the protection of ecosystems. Note that VOCs are treated as 100% benzene in the assessment (Environment Agency (EA), 2021b). These pollutants are considered to be most relevant to the assessment of effects because they have been identified through successive rounds of local authority and national level review and assessment as those which are most at risk of exceeding the standards.

13.2.3 Additional pollutants not included in the PEIR have been added to this ES assessment in order to review all potential impacts. An assessment of ammonia (NH_3) from vehicle emissions has been added to the ecological assessment. Also, emissions from the CARE facility of sulphur dioxide (SO_2), volatile organic compounds (VOCs) and carbon monoxide (CO) have been added to assess potential impacts.

13.2.4 Table 13.2.2 sets out averaging periods for the pollutants. 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.

13.2.5 Ultrafine particles (UFP) are defined as those with an aerodynamic diameter less than 100 nanometres ($PM_{0.1}$). Stakeholders queried if UFP would be assessed, so the ES considers the best approach to their assessment. There is no established modelling methodology for UFPs and although there is evidence of health impacts, there is limited data due to the lack of long-term exposure studies. There is currently no legislated standard for UFPs. However, $PM_{2.5}$ is considered to be a good indicator of general risk associated with exposure to fine and ultrafine particulate matter, and this has been quantitatively assessed in this ES, to allow an evaluation of effects and to respond to stakeholder queries.

13.2.6 As requested within the Planning Inspectorate Scoping Opinion on 11 October 2019 (Planning Inspectorate, 2019) a review of pollutant emissions, particularly for SO_2 has been carried out. Also, as requested SO_2 has been added to the assessment associated with emissions from the CARE facility. SO_2 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. Emissions of sulphur from aircraft and other on-airport sources are not a concern, as has been demonstrated through the local authority review and assessment process and monitoring at airports in the UK; further detail is provided in the baseline (Section 13.7).

Table 13.2.2: 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 (99.79th 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 (90.41st percentile)
Fine particulate matter ($PM_{2.5}$)*	Annual mean	12 µg/m^3 (by the end of January 2028) 10 µg/m^3 (by 2040)
Carbon monoxide (CO)	Maximum daily running 8-hour mean	10 µg/m^3, not to be exceeded (100th percentile)
Sulphur dioxide (SO_2)	15-minute mean	266 µg/m^3, not to be exceeded more than 35 times a year (90.90th percentile)
	1-hour mean	350 µg/m^3, not to be exceeded more than 24 times a year (99.73rd percentile)
	24-hour mean	125 µg/m^3, not to be exceeded more than 3 times a year (99.18th percentile)
Benzene (as VOCs)	Annual mean	5 µg/m^3
Natural Environment		
Oxides of nitrogen (NO_x)**	Annual mean	30 µg/m^3

Pollutant	Averaging Period	Air Quality Standard
Sulphur dioxide (SO_2)	Annual mean	20 µg/m^3 (10 µg/m^3 where lichens or bryophytes are present)
Ammonia (NH_3)*	Annual mean	3 µg/m^3 (1 µg/m^3 where lichens or bryophytes are present)

* The assessment has been undertaken using the interim standard of 12 µg/m^3 (Section 13.5)

** The air quality standard for the natural environment is oxides of nitrogen, however further assessment is also undertaken in relation to acid and nitrogen deposition. This is further described in Section 13.5 Assessment Methodology.

Planning Policy Context

13.2.7 The Airports National Policy Statement (ANPS) does not have effect in relation to an application for development consent for an airport development not comprised of an application relating to the Heathrow Northwest Runway. Nevertheless, as set out within paragraph 1.41 of the ANPS, the Secretary of State considers that the contents of the ANPS will be both important and relevant considerations in the determination of the Project application, particularly where it relates to London or the south east of England. In particular, the ANPS makes clear that, alongside the provision of a new Northwest Runway at Heathrow, the government supports other airports making best use of their existing runways as set out in Beyond the Horizon: Making best use of existing runways (MBU), which is the specific policy context for this application.

13.2.8 In addition, whilst the ANPS does not have effect in relation to the Project, it sets out a number of principles for environmental impact assessment and compliance and these will be an important and relevant consideration in the determination of the application for development consent. A summary of the relevant provisions for the air quality assessment and how and where these have been addressed in this ES is provided within Table 13.2.4.

13.2.9 Other policy relevant to air quality is summarised in Table 13.2.3.

Table 13.2.3: Air Quality Policy

Policy	How/Where Taken into Account in ES
National Planning Policy Framework (NPPF) (Department for Levelling Up, Housing and Communities, 2021) The NPPF refers to how the planning system should contribute to and enhance the natural and local environment and prevent new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of air pollution (Paragraph 174); how planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national standards for pollutants (Paragraph 186); and actively managing sustainable transport to	The mitigation considered in Section 13.9. looks to reduce impacts, even at locations where the standards are not predicted to be exceeded. The standards have been used in the assessment as provided in Table 13.2.2, which include values relevant to the natural environment.

Policy	How/Where Taken into Account in ES
help reduce congestion and emissions and improve air quality (Paragraph 105).	
National Policy Statement for National Networks (NNNPS) (Department for Transport, 2014)[1] The NNNPS sets out the need for, and Government's policies to deliver, development of nationally significant infrastructure projects on the national road and rail networks in England. It provides planning guidance for promoters of nationally significant infrastructure projects (NSIP) on the road and rail networks. The provisions of the NNNPS relevant to environmental assessment broadly mirror those as outlined in the ANPS.	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, 2014a) is a relevant consideration for the Project.
The Clean Air Strategy 2019 (Defra, 2019) 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. The strategy provides the framework for ensuring compliance with air quality standards based on a combination of international, national and local measures to reduce emissions and improve air quality. There is also a long-term target for reducing population exposure to $PM_{2.5}$ concentrations to meet the World Health Organisation's (WHO) 2005 target of 10µg/m^3 (World Health Organisation, 2021) as an annual mean.	This assessment considers current legislated standards in the Air Quality Standards Regulations (UK Government, 2016). These standards have been provided in Table 13.2.2 and used in the assessment. However, the aspirations of the Strategy are considered in the mitigation provided in Section 13.9. The mitigation looks to reduce impacts, even at locations where the standards are not predicted to be exceeded.
Aviation Policy Framework (Department for Transport, 2013)	An assessment of potential air quality impacts from the construction and operational periods has been undertaken as provided in the methodology in **ES Appendix 13.4.1: Air**

[1] The Department for Transport published a revised draft National Policy Statement for National Networks ("NPSNN") for consultation on 14 March 2023. The draft NPSNN confirms in paragraph 1.16 that the existing NPSNN remains the relevant government policy and has full force and effect in relation to any applicable applications for development consent accepted for examination before designation of the updated NPSNN. The draft NPSNN further notes in paragraph 1.17 that the emerging draft NPSNN is capable of being an important and relevant consideration in the Secretary of State's decision making process. As such, the Applicant will continue to monitor the progress of the NPSNN review process and incorporate any updates to the Project's application documentation where considered appropriate in due course.

Policy	How/Where Taken into Account in ES
The aviation policy framework sets out the government's policy to allow the aviation sector to continue to make a significant contribution to economic growth across the country. It provided the baseline for the Airports Commission to take into account environmental impacts in their reviews. It sets out government's objectives on the issues which will challenge and support the development of aviation across the UK. The policy on air quality is to seek improved international standards to reduce emissions from aircraft and vehicles and to work with airports and local authorities as appropriate to improve air quality, including encouraging HGV, bus and taxi operators to replace or retrofit with pollution-reducing technology older, more polluting vehicles. The policy states that around airports, sources of air pollution include aircraft engines, airport related traffic on local roads and surface vehicles at the airport. The most important pollutants are NO_x and particulate matter (PM_{10} and $PM_{2.5}$). Air quality in local air quality management areas or where limit values are exceeded are particularly sensitive to new developments or transport pressures, and cumulative impacts from different individual sites can exacerbate this. Airports are large generators of surface transport journeys and as such share a responsibility to minimise the air quality impact of these operations.	**Quality Assessment Methodology** (Doc Ref.5.3), including emissions of NO_x, PM_{10} and $PM_{2.5}$ from the airport and airport related traffic. The air quality impacts at receptors including those within AQMAs are presented in **ES Appendix 13.9.1: Air Quality Results Tables and Figures P1-2 and P4-6** (Doc Ref.5.3). The mitigation considered in Section 13.9 looks to reduce impacts, even at locations where the standards are not predicted to be exceeded.
Aviation strategy: making best use of existing runways (HM Government, 2018b) As a result of the Aviation strategy call for evidence and further analysis, government has set out its support of airports beyond Heathrow making best use of their existing runways, subject to related economic and environmental considerations being considered. This document forms part of the government's wider Aviation strategy and sets out the detail of the 'making best use' policy. The key issues raised included the need for environmental issues such as noise, air quality, and	An assessment of potential air quality impacts from the construction and operational periods has been undertaken as provided in the methodology in the methodology in **ES Appendix 13.4.1: Air Quality Assessment Methodology** (Doc Ref.5.3), including emissions of NO_x, PM_{10} and $PM_{2.5}$ from the airport and airport related traffic. The air quality impacts at receptors including those within AQMAs are presented in **ES Appendix 13.9.1: Air Quality Results Tables and Figures P4-6** (Doc Ref.5.3) The mitigation considered in Section 13.9 looks to reduce impacts, even at

Policy	How/Where Taken into Account in ES
carbon to be fully addressed as part of any airport proposal. Most of the concerns raised can be addressed through the existing policies as set out in the 2013 Aviation Policy Framework, or through more recent policy updates such as the new UK Airspace Policy or National Air Quality Plan. For the majority of environmental concerns, the government expects these to be taken into account as part of existing local planning application processes. The government recognises the impact on communities living near airports and understands their concerns over local environmental issues, particularly noise, air quality and surface access. As airports look to make the best use of their existing runways, it is important that adverse impacts are mitigated where possible.	locations where the standards are not predicted to be exceeded.
Aviation Strategy (consultation finished) (Department for Transport, 2018b) The Government has prepared a draft of the Aviation Strategy which will replace the Aviation Policy Framework when finalised. As part of the emerging Aviation Strategy, the Government published a policy paper entitled 'Aviation 2050: The future of UK aviation'. 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*".	Air quality impacts assessed are discussed in Section 13.10. The mitigation considered in Section 13.9 looks to reduce impacts, even at locations where the standards are not predicted to be exceeded.
Flightpath to the future (Department for Transport, 2022a) The Department for Transport set out the 10-year aviation policy framework in May 2022. Section 4 includes reference to the Jet Zero Strategy which	Air quality impacts assessed are discussed in Section 13.10. The mitigation considered in Section 13.9 looks to reduce impacts, even at locations where the standards are not predicted to be exceeded.

Policy	How/Where Taken into Account in ES
includes aims for reducing the aviation industry impacts on local air quality.	
Jet Zero Strategy (Department for Transport, 2022b) The focus of this strategy is reducing CO_2 emissions; however delivery on this can provide other environmental benefits, such as improving air quality.	The aspirations of the Jet Zero Strategy are considered in the mitigation provided in Section 13.9. The mitigation looks to reduce impacts, even at locations where the standards are not predicted to be exceeded.
Decarbonising Transport (Department for Transport, 2021) This plan sets out the government's commitments and the actions needed to decarbonise the entire transport system in the UK. The focus of this strategy is reducing CO_2 emissions; however delivery on this can provide other environmental benefits, such as improving air quality. It includes the pathway to net zero transport in the UK; the wider benefits net zero transport can deliver (including air quality benefits); and the principles that underpin the approach to delivering net zero transport including commitments to end the sale of new petrol and diesel cars and vans by 2030, from 2035 all new cars and vans must be zero emission at the tailpipe.	The vehicle fleet emissions used in this assessment are provided in the methodology in **ES Appendix 13.4.1: Air Quality Assessment Methodology** (Doc Ref.5.3). Future fleet considerations have been based on the best available data at the time of assessment from Defra (Defra, 2021). The aspirations of the Strategy are considered in the mitigation provided Section 13.9. The mitigation looks to reduce impacts, even at locations where the standards are not predicted to be exceeded.

Table 13.2.4: How relevant air quality requirements of ANPS are taken into account in this ES

ANPS Section	How/Where Taken into Account in ES
Paragraph 5.5 "*The Government's objective for surface access is to ensure that access to the airport by road, rail and public transport is high quality, efficient and reliable for passengers, freight operators and airport workers who use transport on a daily basis. The Government also wishes to see the number of journeys made to airports by sustainable modes of transport maximised as much as possible. This should be delivered in a way that minimises congestion and environmental impacts, for example on air quality.*"	**ES Chapter 12: Traffic and Transport** (Doc Ref. 5.1) considers surface access to the airport. The air quality impacts from road traffic have been assessed and the results are presented in Section 13.10**.**
Paragraph 5.33 "*The environmental statement should assess:*	This ES includes an assessment of existing air quality levels for all pollutants at risk of exceeding the air quality limit values in the study area. For

• *Existing air quality levels for all relevant pollutants referred to in the Air Quality Standards Regulations 2010 and the National Emission Ceilings Regulations 2002 (as amended) or referred to in any successor regulations;* • *Forecasts of levels for all relevant air quality pollutants at the time of opening, (a) assuming that the scheme is not built (the 'future baseline'), and (b) taking account of the impact of the scheme, including when at full capacity; and* • *Any likely significant air quality effects of the scheme, their mitigation and any residual likely significant effects, distinguishing between those applicable to the construction and operation of the scheme including any interaction between construction and operational changes and taking account of the impact that the scheme is likely to cause on air quality arising from road and other surface access traffic.*"	detail of the air quality baseline, see baseline information provided in Section 13.7 and **ES Appendix 13.6.1: Air Quality Data and Model Verification** (Doc Ref.5.3). The assessment forecasts levels for all relevant air quality pollutants at the time of opening, with and without the Project in operation. See future baseline information provided in Section 13.7. A summary of impacts has been provided in Section 13.10. The assessment determines the significance of effects from all Project related activities (both construction and operation). A summary of impacts has been provided in Section and **ES Appendix 13.9.1: Air Quality Results Tables and Figures P1-6** (Doc Ref.5.3).
Paragraphs 5.42 and 5.43 set out the considerations for decision-making with regard to air quality. "*5.42 The Secretary of State will consider air quality impacts over the wider area likely to be affected, as well as in the vicinity of the scheme. In order to grant development consent, the Secretary of State will need to be satisfied that, with mitigation, the scheme would be compliant with legal obligations that provide for the protection of human health and the environment.* *5.43 Air quality considerations are likely to be particularly relevant where the proposed scheme:* • *is within or adjacent to Air Quality Management Areas, roads identified as being above limit values, or nature conservation sites (including Natura 2000 sites and Sites of Special Scientific Interest);* • *would have effects sufficient to bring about the need for new Air Quality Management Areas or change the size of an existing Air Quality Management Area, or bring about changes to exceedances of the limit values, or have the potential to have an impact on nature conservation sites; and* • *after taking into account mitigation, would lead to a significant air quality impact in relation to Environmental Impact Assessment and / or to a*	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 impacts has been provided in Section 13.10.

deterioration in air quality in a zone or agglomeration."	

Local Planning Policy

13.2.10 The relevant local planning policies applicable to air quality and taken into account for the assessment based on the extent of the study area for this assessment are summarised in Table 13.2.5 and explained further in **ES Appendix 13.2.1: Local Planning Policy** (Doc Ref. 5.3). These have been considered throughout this air quality assessment where relevant by assessing air quality impacts and reducing any residual effects where possible, as detailed in Section 13.9 and Project Methodology (**ES Appendix 13.4.1: Air Quality Assessment Methodology**) (Doc Ref. 5.3).

Table 13.2.5: Local Planning Policy

Administrative Area	Plan	Policy
Adopted Policy		
Crawley	Crawley Borough Council Air Quality Action Plan 2018 – 2023	Priority 3 Sustainability (Planning and Policy Guidance)
	Crawley 2030: Crawley Borough Local Plan 2015 – 2030	Policy ENV12 Air Quality
Croydon	Croydon Local Plan 2016 – 2036	Policy DM16 – Promoting healthy communities
		Policy SP6 – Environment and Climate Change
		Policy DM23 – Development and construction
		Strategic policy 10.1 – Transport and Communication
	London Borough of Croydon Air Quality Action Plan 2017 – 2022	Section 4 – Air Quality Action Plan
Elmbridge	Elmbridge Borough Council Air Quality Action Plan 2021 – 2026	Section 2 – Elmbridge's Air Quality Priorities – 1 to 5
	Elmbridge Core Strategy 2011 – 2026	Policy CS25 – Travel and Accessibility Section 4 – Elmbridge 2026 Vision
Epsom & Ewell	Epsom & Ewell Borough Council Air Quality Action Plan and Further Assessment of Air Quality for Ewell High Street – 2010	Section 3.4, CS6, CS16, CS1
	Epsom & Ewell Borough Council Core Strategy 2007- 2022	Policy CS 6

Administrative Area	Plan	Policy
Horsham	Horsham District Planning Framework (excluding South Downs National Park) 2015	Strategic Policy 24 Environmental Protection
Kingston Upon Thames	Air Quality in Kingston upon Thames – A Guide for Public Health Professionals – 2022	Section 7 – Policy and Legal Framework for Improving Air Quality
	Royal Borough of Kingston upon Thames Local Development Framework – Core Strategy 2012	Policy CS 1 – Climate Change Mitigation
	Royal Borough of Kingston upon Thames Air Quality Action Plan 2021 – 2026	Section 2 – Priorities
Merton	London Borough of Merton Air Quality Action Plan 2018 – 2023	Section 4 – Merton's Air Quality Priorities
	Merton Council Local Development Framework Core Planning Strategy 2011	Policy CS 20 – Parking Servicing and Delivery
Mid Sussex	Mid Sussex: Air Quality Action Plan (2021)	Section 1.1. Purpose of the Air Quality Action Plan
	Mid Sussex District Plan 2014 – 2031	DP29: Noise, Air and Light Pollution
	Mid Sussex: Air Quality and Emissions Mitigation Guidance for Sussex (2021)	The National Planning Policy Framework and air quality
Mole Valley	Mole Valley Core Strategy 2009 – 2026	CS Policy 20: Reduced Flood Risk and Environmental Pollution
Reigate and Banstead	Reigate and Banstead Local Plan: Core Strategy 2014 – 2027	Policy CS9: Gatwick Airport
		Policy CS10 Sustainable development
	Reigate and Banstead Local Plan Development Management Plan 2019 – 2027	Policy DES8: Construction management
		Policy DES9: Pollution and contaminated land
Runnymede	Runnymede Borough Council Air Quality Action Plan 2014	Section 3.2.2 Climate Change Strategies
		Section 6 – Proposed Measures
	Runnymede Borough Council 2020 – 2030 Local Plan	Policy EE2: Environmental Protection
Sevenoaks	Sevenoaks District Council Core Strategy 2011 – 2026	Policy SP 2 Sustainable Development
	Sevenoaks Town Neighbourhood Plan 2020 – 2038	Theme Three – Movement and Public Realm – Objective Eight
Sutton	London Borough of Sutton Local Plan 2016 – 2031	Policy 34 – Environmental Protection

Administrative Area	Plan	Policy
	London Borough of Sutton Air Quality Action Plan 2019 – 2023	Section 2.4 – Issues and Priorities
Tandridge	Tandridge District Core Strategy 2008 – 2026	Policy CSP 16 Aviation Development
	Tandridge Local Plan Part 2: Detailed Policies 2014 – 2029	DP22: Minimising Contamination, Hazards & Pollution
Tonbridge and Malling	Tonbridge and Malling Borough Council Local Development Framework Core Strategy 2007 – 2021	Policy CP1: Sustainable Development
	Tonbridge and Malling Borough Council Air Quality Action Plan 2022 – 2027	Section 1.5: Key Priorities
	Tonbridge and Malling Borough Council Regulation 18 Local Plan 2022	Section 5.9.16: Local – Pollution
Surrey County Council	Surrey County Council Electric Vehicle Strategy 2011 – 2026	Surrey Transport Plan: Electric Vehicle Strategy
	Surrey County Council Low Emissions Transport Strategy 2011 – 2026	Section 4 – Aim and preferred approach
	Woking Local Development Document– Woking Core Strategy 2012 – 2027	Policy CS18: Transport and accessibility
	Woking Local Development Documents – Development Management Policies Development Plan Document 2016 – 2027	Policy DM6 – Air and Water Quality
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
Horsham	Horsham District Local Plan 2021 – 2038 (Regulation 19 Draft Copy)	Strategic Policy 1 – Sustainable Development
		Policy 24 – Strategic Policy: Environmental Protection
		Policy 26 – Air Quality
Mole Valley	Future Mole Valley Draft Local Plan 2020 – 2037	Policy S5: Retaining and Investing in Natural Capital

Administrative Area	Plan	Policy
		Policy EN12: Pollution Control
Sevenoaks	Sevenoaks District Council Draft Air Quality Action Plan (for consultation) 2021	Section 3.5 – Key Priorities
Tandridge	Tandridge District Council Our Local Plan: 2033 (Regulation 22 submission)	TLP46: Pollution and Air Quality

13.3. Guidance

13.3.1 The relevant air quality guidance documents taken into account for the assessment are summarised in Table 13.3.1. These have been considered throughout this air quality assessment where relevant.

Table 13.3.1: Air quality guidance

Guidance	How/Where Taken into Account in ES
Local Air Quality Management Technical Guidance (Defra, 2022) The Local Air Quality Management (LAQM) Technical Guidance (TG22) is designed to support local authorities in carrying out their duties to review and assess air quality in their area. It provides the technical guidance for conducting air quality assessments using existing air quality tools.	Sensitive receptors have been defined and assessed as per the EPUK/IAQM (IAQM and EPUK, 2017) and Defra Technical Guidance (Defra, 2022). Further details are provided in this ES Chapter (13.5.11 to 13.5.21) with all modelled sensitive receptors presented in **ES Appendix 13.6.2: Air Quality Receptors** (Doc Ref. 5.3). This guidance has additionally been taken into account in the assessment methodology in **ES Appendix 13.4.1: Air Quality Assessment Methodology** (Doc Ref. 5.3) and air quality baseline and verification in **ES Appendix 13.6.1: Air Quality Data and Model Verification** (Doc Ref. 5.3).
Institute of Air Quality Management Dust Guidance (IAQM, 2014) The Institute of Air Quality Management (IAQM) dust guidance provides a methodology for development consultants and environmental health officers on how to assess air quality impacts from demolition and construction.	Sensitive receptors for dust have been defined and assessed as per the IAQM (IAQM, 2014) guidance. The effects from demolition and construction of the Project have been assessed using the qualitative approach described in the IAQM guidance. Further details are provided in this **ES Chapter (13.5.43 – 13.5.50).**

Guidance	How/Where Taken into Account in ES
EPUK/IAQM Land Use Planning and Development Control (IAQM and EPUK¸2017) The Land-Use Planning and Development Control guidance document produced by Environmental Protection UK (EPUK) and the IAQM provides a framework for professionals operating in the planning system to provide a means of reaching sound decisions, having regard to the air quality implications of development proposals. The document provides guidance on when air quality assessments are required by providing screening criteria regarding the size of a development, changes to traffic flows/composition energy facilities or combustion processes associated with the development.	Sensitive receptors have been defined and assessed as per the EPUK/IAQM (IAQM and EPUK, 2017) and Defra Technical guidance (Defra, 2022). Further details are provided in this ES Chapter **(13.5.11 to 13.5.21)** with all modelled sensitive receptors presented in **ES Appendix 13.6.2: Air Quality Receptors** (Doc Ref. 5.3). The significance of effects have been calculated as per the EPUK/IAQM guidance. Further details are provided in this ES Chapter (13.5.30).
IAQM guide to the assessment of air quality impacts on designated nature conservation sites (IAQM, 2020) The IAQM published guidance for assisting in the assessment of the air quality impacts of development on designated nature conservation sites.	The methodology for the assessment of significance at ecological receptors follows the IAQM guidance and Natural England guidance documents (IAQM, 2020) (Natural England, 2018).
Natural England's approach to advising competent authorities on the assessment of road traffic emissions under the Habitats Regulations (Natural England, 2018) This guidance is designed to assist in giving practical and proportionate advice on the assessment of the potential impacts from road traffic emissions on the qualifying features of Designated Sites.	The methodology for the assessment of significance at ecological receptors follows the IAQM guidance and Natural England guidance documents (IAQM, 2020) (Natural England, 2018).
IAQM Monitoring in the Vicinity of Demolition and Construction (IAQM, 2018a) The IAQM has published guidance on air quality monitoring in the vicinity of demolition and construction sites, providing an update to the 2012 IAQM publication, and takes into account new research, feedback from users of the 2012	This guidance has been taken into account in the construction dust monitoring recommendations, outlined in **ES Appendix 13.8.1: Construction Period Mitigation** (Doc Ref. 5.3).

Guidance	How/Where Taken into Account in ES
Guidance, and advances in monitoring technology.	
IAQM Odour and Planning Guidance (IAQM, 2018) The IAQM has published guidance for assessing odour impacts (on amenity) for planning purposes. This includes information on various assessment methods to be used to undertake odour assessments for planning.	This guidance has been taken into account in the odour impact assessment methodology **in ES Appendix 13.4.1: Air Quality Assessment Methodology** (Doc Ref. 5.3).
International Civil Aviation Organization (ICAO) Airport Air Quality Manual (ICAO, 2020) The ICAO has published a manual for assessing air quality at airports. This document describes the methods for calculating emissions during different operating modes of the aircraft, as well as various sources of air pollution found at airports.	This guidance has been taken into account in the aircraft emissions methodology in **ES Appendix 13.4.1: Air Quality Assessment Methodology** (Doc Ref. 5.3).
Air Navigation Guidance 2017 (Department for Transport, 2017) In January 2002, the then Department for Transport, Local Government and the Regions issued guidance to the Civil Aviation Authority (CAA) which has subsequently formed the basis of how the CAA interprets its environmental duties in respect of carrying out its air navigation functions including approving changes to the UK's airspace design. With regards to air quality, the guidance states: "*Studies have shown that NO_x emissions from aviation related operations reduce rapidly beyond the immediate area around the runway. Due to the effects of mixing and dispersion, emissions from aircraft above 1,000 feet are unlikely to have a significant impact on local air quality. Therefore*	The ES has regard to the Air Navigation Guidance 2017 (Department for Transport, 2017) as noted in Table 13.2.3 and as detailed in the methodology in **ES Appendix 13.4.1: Air Quality Assessment Methodology** (Doc Ref. 5.3).

Guidance	How/Where Taken into Account in ES
the impact of airspace design on local air quality is generally negligible compared to changes in the volume of air traffic and that of the local transport infrastructures feeding the airport."	
World Health Organization (WHO) global air quality guidelines (WHO, 2021) The 2021 guidelines update the previous 2006 edition with generally more stringent guidelines for pollutants. These guidelines take into account the latest body of evidence on the health impacts of different air pollutants. The overall objective of the updated global guidelines is to offer quantitative health-based recommendations for air quality management, expressed as long- or short-term concentrations. These guidelines are not legally binding standards.	The World Health Organisation (WHO) global air quality guidelines are not currently part of UK legislation or policy, so the thresholds used to assess schemes remain those identified above. Until such thresholds are changed, which may or may not reflect the WHO Guidelines, then assessment is undertaken in accordance with current legislation which is consistent with policy standards. To determine the significance of air quality impacts the methodology detailed in Section 13.5. The mitigation considered in Section 13.9 looks to reduce impacts, even at locations where the UK standards are not predicted to be exceeded.

13.4. Consultation and Engagement

13.4.1 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 periods 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. The Scoping Report is provided in **ES Appendix 6.2.1: Scoping Report** (Doc.Ref.6.2).

13.4.2 Following consultation with the statutory bodies, the Planning Inspectorate (on behalf of the SoS) provided a Scoping Opinion on 11 October 2019 (Planning Inspectorate, 2019). The Scoping Opinion is provided in **ES Appendix 6.2.2: Scoping Opinion** (Doc.Ref.6.2).

13.4.3 Key issues raised by the Planning Inspectorate (PINS) during the scoping process specific to air quality are listed in Table 13.4.1, together with details of how these issues have been taken into account in the ES. Details of the remaining scoping consultee responses are provided in **ES Appendix 13.3.1: Summary of Stakeholder Scoping Responses – Air Quality** (Doc Ref. 5.3).

Table 13.4.1: Summary of PINS Scoping Responses

Details	How/Where Taken into Account in ES
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.	As noted in Section 13.2.2, the pollutants at risk of giving rise to significant effects have been included in the assessment. This includes NO_x, NO_2, PM_{10} and $PM_{2.5}$ from all sources and SO_2, VOCs and CO from the CARE facility. No other pollutants have been identified that would be likely to give rise to significant air quality effects. Justification for screening out SO_2 from sources other than the CARE facility is provided in the baseline section of this ES Chapter (Section 13.2). The key reason is the historical evidence which shows SO_2 is not at risk of exceeding the relevant objectives and the change in emissions could not result in a significant impact.
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	No significantly odorous materials are expected to be excavated during construction of the Project. Large amounts of putrescible waste are not indicated to be present on the Project site that would likely give rise to significant odour issues. Further detail is provided in this ES Chapter (and a list of potential contamination areas which have the potential to produce odours is provided in **ES Chapter 10: Geology and Ground conditions** (Doc Ref 5.1).

Details	How/Where Taken into Account in ES
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.	If any potential sources of odour are identified during the works, suitable mitigation will be implemented via the Code of Construction Practice (CoCP) (**ES Appendix 5.3.2** (Doc Ref.5.3)).
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. 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).	A commitment to monitoring construction dust at high risk sites following IAQM guidance (IAQM, 2014) has been included in the Application and agreed with the local planning authorities who attend the topic working groups. Details of how it is implemented and how the assessment relies on the delivery of monitoring are outlined in ES **Appendix 13.8.1: Construction Period Mitigation** (Doc Ref. 5.3) and provided in the CoCP (**ES Appendix 5.3.2** (Doc Ref.5.3)). Riverside Garden Park has been assessed as a receptor in the construction dust assessment in this ES Chapter as detailed in Section 13.5.11.
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 NO_x 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

Details	How/Where Taken into Account in ES
	quality due to stringent legislation on liquid fuels included in the Sulphur Content of Liquid Fuels Regulations 2014, which have 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) (**ES Appendix 9.9.1: Habitats Regulations Assessment Report** (Doc Ref. 5.3)).
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.	The Affected Road Network (ARN) was defined by the transport data as detailed in Section13.5. All AQMAs in the study area have been assessed, with the full list of modelled receptors and predicted concentrations in **ES Appendix 13.9.1: Air Quality Results Tables and Figures P1-2 and P4-6** (Doc Ref. 5.3). A summary of impacts within AQMAs is reported in this ES Chapter (Section 13.10) for construction and operation. Maximum NO_2 concentrations at AQMAs are summarised and presented in **ES Appendix 13.9.1: Air Quality Results Tables and Figures P4-6** (Doc Ref. 5.3).
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. 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.	A full review of all baseline data in the study area has been carried out as detailed in Section 13.7. The assessment also uses data from a monitoring survey undertaken between 2016 and 2020 at key areas of concern around the airport. This Chapter contains full details of relevant monitoring carried out to inform this Application, including sites along the A23 and near to Hazelwick Roundabout. The results were used to inform the baseline conditions reported in the ES. Relevant information is presented in Section 13.7 and in **ES**

Details	How/Where Taken into Account in ES
	Appendix 13.6.1: Air Quality Data and Model Verification (Doc Ref. 5.3). Baseline data was determined with the monitored data; professional judgement was not required.
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.	This ES Chapter contains details of how future background concentrations have been assessed and how predicted growth has influenced the future baseline (Section 13.7).
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 road traffic flows due to the Project within the road Traffic Reliability Area (TRA)[2] in addition to the roads assessed within a 11 km by 10 km domain centred on the airport (Figure 13.1.11). Therefore, discrete receptors (human and ecological) outside of the 11 km by 10 km domain have been assessed. The ES has regard to the Air Navigation Guidance 2017 (Department for Transport, 2017) as noted in Table 13.2.3 and as detailed in the methodology in **ES Appendix 13.4.1: Air Quality Assessment Methodology** (Doc Ref. 5.3). Further methodology details of the roads and receptors included in the assessment are described in Section 13.5 0 with all receptors presented in **ES Appendix 13.6.2: Air Quality Receptors** (Doc Ref. 5.3).
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).	This ES Chapter includes 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 air quality assessment is detailed in **ES Appendix 13.4.1: Air Quality Assessment Methodology** (Doc Ref. 5.3).

[2] The traffic reliability area is defined as the area in which the road traffic model has been calibrated and validated to with the use of observed data.

Details	How/Where Taken into Account in ES
	The assessment takes into account the combined impact from all sources.
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.	This chapter has considered emerging policy and legislation (where appropriate). 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 have been assessed in the ES (both in this ES Chapter and **ES Appendix 13.9.1: Air Quality Results Tables and Figures P1-2 and P4-6** (Doc Ref 5.3)).
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 (IAQM and EPUK, 2017) and Defra Technical Guidance (TG22) (Defra, 2022) and represent best practice for an air quality assessment. Further details are provided in this chapter (13.5.11 to 13.5.21) with all modelled sensitive receptors presented in **ES Appendix 13.6.2: Air Quality Receptors** (Doc Ref. 5.3). The contours (Figure 13.1.1 to 13.1.9) represent locations of relevant short-term receptors on site such as hotels, offices and employees. All receptor types listed have been taken into account.
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 through 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).	Details on the methodology and assumptions for the emissions inventory for this ES assessment are presented in **ES Appendix 13.4.1: Air Quality Assessment Methodology** (Doc Ref.5.3). The assessment has been based on the best estimate of emissions and conservative assumptions where applicable.

Details	How/Where Taken into Account in ES
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.	Three new pumping stations and a water treatment works will be provided and connect to existing infrastructure (further described in **ES Chapter 5 Project Description** Doc Ref 5.1). A review of all potential odour sources and their impacts has been included in this ES with results being presented in Section 13.10.176.
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 Sussex Guidance has been taken into account in commitments made to mitigate air quality impacts. However, the specific damage cost calculation requirements from the Sussex Guidance have not been applied because there is no requirement or justification for doing so under the ANPS and NNNPS. It is recognised that the Sussex Guidance requires an assessment of transport emissions associated with the Project. The air quality assessment for the ES has included all routes likely to be used by construction traffic around the airport, and any roads affected during operation. Pollutant concentrations have been predicted at discrete receptors in the AQMAs and the wider study area. Details of the air quality assessment methodology are included in **ES Appendix 13.4.1: Air Quality Assessment Methodology** (Doc Ref. 5.3). The air quality assessment has indicated that there are no significant effects as a result of the Project and the Project is not predicted to impact compliance with the air quality standards.

Details	How/Where Taken into Account in ES
	The underlying rationale of the Sussex Guidance is to seek the mitigation of NO_x and $PM_{2.5}$. This has been considered in Section 13.9. The Carbon Action Plan (**ES Appendix 5.4.2: Carbon Action Plan** Doc Ref. 5.3) which details commitments made to mitigate carbon emissions and will reduce emissions of pollutants. Actions being taken to reduce impacts to air quality from surface access are also included in the Surface Access Commitments (SAC) (**ES Appendix 5.4.1: Surface Access Commitments** (Doc Ref. 5.3)). Monitoring commitments are intended to be secured under the Section 106 Agreement to be entered in relation to the Project. This approach is considered consistent with the principles and guidance set out in the Sussex Guidance and it follows requirements for EIA and NPSs.

13.4.4 The PEIR was issued to inform the statutory consultation carried out on the Project in Autumn 2021. It presented the preliminary findings of the EIA process for the Project at that time. The consultation responses specific to the air quality assessment and the way in which they have been taken into account in this ES chapter are set out in Table 13.4.2 below and further detail in **ES Appendix 13.3.2: Summary of Stakeholder Consultation Responses – Air Quality** (Doc Ref.5.3). Further detail about the way in which the consultation responses have been addressed are provided in the 13-29eparatee Consultation Report that accompanies the Development Consent Order (DCO) application.

Table 13.4.2: Summary of Consultation in Response to the PEIR

Consultee	Key Themes	How/Where Taken into Account in ES
Local authorities	The local authorities provided comments on the following key themes: ▪ Model set up ▪ Air quality mitigation ▪ Air quality monitoring	Key technical items have been addressed through the topic working groups. All model set up queries are addressed in the methodology appendix (**ES Appendix 13.4.1: Air Quality Assessment Methodology** (Doc Ref.5.3)). Other key questions around mitigation and monitoring have been addressed in consultation with the local authorities and the details are presented Section 13.9.

13.4.5 In June 2022 an additional consultation was undertaken to update stakeholders and the local community on the ongoing work and refinement to the Project proposals, which included a targeted, statutory consultation on the design changes to the proposed highway improvement changes. As these changes to the Project could lead to new or materially different significant environmental effects compared to those reported in the PEIR, an updated PEI was issued as part of this additional consultation. The consultation responses specific to the air quality assessment and the way in which they have been taken into account in this ES chapter are set out in Table 13.4.3 and **ES Appendix 13.3.2: Summary of Stakeholder Consultation Responses – Air Quality** (Doc Ref.5.3). Further detail about the way in which the consultation responses have been addressed are provided in the separate Consultation Report that accompanies the DCO application.

Table 13.4.3: Summary of Consultation in Response to the Updated PEI

Consultee	Date	Key Themes	How/Where Taken into Account in ES
Local authorities	June 2022	Comments were provided by the local authorities regarding air quality mitigation and air quality monitoring.	Key questions around mitigation and monitoring have been addressed in consultation with the local authorities and the details are presented in Section 13.9.

13.4.6 Outside of the above-described public consultations, GAL also continued to engage with key stakeholders through the topic working groups and during such engagement, key issues raised specific to the air quality assessment are listed in Table 13.4.4, together with details of how these issues have been taken into account in the ES.

Table 13.4.4: Summary of Consultation and Engagement

Consultee	Date	Details	How/Where Taken into Account in ES
Local Planning Authority Air Quality, Carbon and Climate Change Topic Working Group: Local Planning Authorities (Crawley Borough Council (CBC), Reigate and Banstead Borough Council (RBBC), 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 August 2019	Discussion on topics including: ▪ modelling of certain sensitive receptors such as Ashdown Forest; ▪ scenario years; ▪ strategic road traffic model being used for the ES; ▪ study area extent; ▪ odour assessment; ▪ source apportionment; and ▪ height of modelling aircraft emissions.	The relevant points were taken into account during the preparation of the ES and details of the methodology are included in **ES Appendix 13.4.1: Air Quality Assessment Methodology** (Doc Ref.5.3).

Consultee	Date	Details	How/Where Taken into Account in ES
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, Charlwood Parish Council, Horley Town Council, Coast to Capital LEP)	3 September 2019	Presentations on: ▪ scope of assessment and methodology; ▪ scenarios years; ▪ study area extent; and ▪ sensitive receptors.	The relevant points were taken into account during the preparation of the ES and details of the methodology are included in **ES Appendix 13.4.1: Air Quality Assessment Methodology** (Doc Ref.5.3).
Local Planning Authority Air Quality, Carbon and Climate Change Topic Working Group: Local Planning Authorities (CBC, RBBC, Mole Valley District Council, West Sussex County Council, Surrey County Council, Horsham District Council, Mid Sussex District Council)	27 January 2020	Project update including: ▪ air traffic forecasts; ▪ proposed developments; ▪ construction; and ▪ DCO timeline.	The relevant points were taken into account during the preparation of the ES and details of the methodology are included in **ES Appendix 13.4.1: Air Quality Assessment Methodology** (Doc Ref.5.3).
CBC and RBBC	25 March 2021	Request for records of odour complaints in the local planning authority area for the past 5 years.	A qualitative assessment of odour complaints is provided in Section 13.7.
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.	Monitoring information for the latest year of monitoring data is detailed in Section 13.7 and is provided in **ES Appendix 13.6.1: Air Quality Data and Model Verification** (Doc Ref.5.3).

Consultee	Date	Details	How/Where Taken into Account in ES
Topic working group – Air Quality Meeting 1 Mid Sussex District Council, Surrey County Council, CBC, RBBC, Mole Valley District Council, Horsham District Council, Local authority technical support (AECOM)	11 May 2022	Responses to PEIR comments including: ▪ Air quality action plan; ▪ Modelling methodology; ▪ Presentation of results; ▪ Monitoring; ▪ Health impacts; ▪ Pier 7 APU; ▪ Uncertainty of emissions over time; ▪ Sussex Air Guidance; ▪ Habitat regulations assessment; ▪ Ammonia; and ▪ Ecological assessment.	The relevant points were taken into account during the preparation of the ES and details of the methodology are included in **ES Appendix 13.4.1: Air Quality Assessment Methodology** (Doc Ref.5.3). Further detail on the consultation responses is provided in **ES Appendix 13.3.2: Summary of Stakeholder Consultation Responses – Air Quality** (Doc Ref.5.3).
Topic working group – Air Quality Meeting 2 Mid Sussex District Council, CBC, RBBC, Mole Valley District Council, East Sussex County Council, Local authority technical support (AECOM)	21 June 2022	Further discussion in relation to PEIR comments, focused on: ▪ Health impacts; ▪ Pier 7 APU; ▪ Uncertainty of emissions over time; ▪ Sussex Air Guidance; ▪ Results (source apportionment).	The relevant points were taken into account during the preparation of the ES and details of the methodology are included in **ES Appendix 13.4.1: Air Quality Assessment Methodology** (Doc Ref.5.3). Further detail on the consultation responses is provided in **ES Appendix 13.3.2: Summary of Stakeholder Consultation Responses – Air Quality** (Doc Ref.5.3).
Multiple local planning authorities within the study area	June to October 2022	Requests for latest year of monitoring data in the local planning authority area.	Monitoring information for the latest year of monitoring data is

Consultee	Date	Details	How/Where Taken into Account in ES
			detailed in Section 13.7 and is provided in **ES Appendix 13.6.1: Air Quality Data and Model Verification** (Doc Ref.5.3).
Topic working group – Air Quality Meeting 3 Mid Sussex District Council, CBC, RBBC, Wealden District Council, Mole Valley District Council, Horsham District Council, Local authority technical support (AECOM)	14 July 2022	Summary of previous technical working groups discussions.	The relevant points were taken into account during the preparation of the ES and details of the methodology are included **in ES Appendix 13.4.1: Air Quality Assessment Methodology** (Doc Ref.5.3).
Topic working group – Air Quality Meeting 4 Kent County Council, Mid Sussex District Council, CBC, RBBC, Wealden District Council, Local authority technical support (AECOM)	21 October 2022	Confirmation of approach for remaining items from PEIR consultation and technical discussion, including; ▪ Construction dust monitoring; ▪ Operational period air quality monitoring; ▪ Outline air quality action plan; ▪ Sussex Air Guidance; ▪ Topic interactions (health, AQ and economics); and ▪ 2047 assessment.	The construction dust monitoring commitment is provided **in ES Appendix 13.8.1: Construction Period Mitigation** (Doc Ref.5.3). The mitigation considered in Section 13.9 looks to reduce impacts, even at locations where the standards are not predicted to be exceeded. The response for the Sussex Air Guidance query is provided in **ES Appendix 13.3.2: Summary of Stakeholder Consultation Responses – Air Quality** (Doc Ref.5.3).

Consultee	Date	Details	How/Where Taken into Account in ES
			The 2047 results are provided in Section 13.10.
Modelling methodology meeting RBBC, Horsham District Council, Local authority technical support (AECOM)	11 November 2022	Discussion of technical air quality modelling methodology to close out PEIR consultation comments, including: ▪ Study area; ▪ Roads modelling set-up; ▪ Model verification; ▪ Model outputs; and ▪ Data provision.	The relevant points were taken into account during the preparation of the ES and details of the methodology are included in **ES Appendix 13.4.1: Air Quality Assessment Methodology** (Doc Ref.5.3).
Topic working group – Air Quality Meeting 5 Mid Sussex District Council, CBC, RBBC, Wealden District Council, Mole Valley District Council, Horsham District Council, Local authority technical support (AECOM)	8 December 2022	Summary of preliminary results from the ES assessment including: ▪ Construction dust assessment; ▪ Operational assessment; ▪ Emissions inventory results; ▪ Monitoring plans; and ▪ Update on Outline AQAP.	The meeting was to present results based on the agreed methodology as set out **in ES Appendix 13.4.1: Air Quality Assessment Methodology** (Doc Ref.5.3).
Topic working group – Air Quality Meeting 6 Mid Sussex District Council, CBC, RBBC, Wealden District Council, Mole Valley District Council, Horsham District Council, Local authority technical support (AECOM)	16 January 2023	Further presentation of modelled results and discussion to explain results to consultees.	The results presented were based on the agreed methodology as set out **in ES Appendix 13.4.1: Air Quality Assessment Methodology** (Doc Ref.5.3).
Topic working group – Air Quality Meeting 7 Mid Sussex District Council, CBC, RBBC, Wealden District Council, Mole Valley District Council, Horsham District	23 February 2023	Review of statement of common ground. Presentation of Clapp and Jenkin approach and review of road modelling within 500m of major roads.	The results presented were based on the agreed methodology as set out in **ES Appendix 13.4.1: Air Quality Assessment**

Consultee	Date	Details	How/Where Taken into Account in ES
Council, Local authority technical support (AECOM)			**Methodology** (Doc Ref.5.3).

13.5. Assessment Methodology

Scope of the Assessment

13.5.1 The scope of this ES has been developed in consultation with relevant statutory and non-statutory consultees as detailed in Table 13.4.1 to Table 13.4.4.

13.5.2 Taking into account the scoping and consultation process, Table 13.5.1 summarises the issues considered as part of this assessment.

Table 13.5.1: Issues Considered in the Assessment

Activity	Potential Effects
Construction Period (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 NO_2, 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 NO_2, PM_{10} and $PM_{2.5}$ concentrations, and harm to ecological receptors due to increased NO_x concentrations.
Operational Period: Air Quality	
Use of airport including aircraft, road traffic (and including upgraded highway junctions) and on-site plant	Emissions from road traffic causing human health impacts due to increased NO_2, PM_{10} and $PM_{2.5}$ concentrations, and harm to ecological receptors due to increased concentrations, nitrogen and acid deposition.
	Aircraft emissions causing human health impacts due to increased NO_2, PM_{10} and $PM_{2.5}$ concentrations, and harm to ecological receptors due to increased NO_x concentrations and nitrogen and acid deposition.
	Emissions from airport operations/combustion plant causing human health impacts due to increased NO_2, NO_x PM_{10} and $PM_{2.5}$ concentrations, and harm to ecological receptors due to increased NO_x, NH_3 concentrations and nitrogen and acid deposition.
	Emissions from the CARE facility (a biomass boiler process at Gatwick Food Waste to Energy Plant) causing human health impacts due to

Activity	Potential Effects
	increased NO_x, NO_2, PM_{10}, $PM_{2.5}$, VOC, SO_2 and CO and harm to ecological receptors due to increased NO_x concentrations, nitrogen and acid deposition. Plume visibility assessment from CARE facility.
	Increased emissions of odours from operations (eg aircraft fuel, other airport operations/plant) causing annoyance.

13.5.3 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 13.5.2.

Table 13.5.2: Effects Scoped Out of the Assessment

Effect	Justification
Assessment of odour emissions from the ground works during construction related ground excavation.	It is not anticipated that any odorous materials will be excavated or used during the construction period. Large amounts of putrescible waste are not present on the Project site that would give rise to significant odour issues. Where any potential sources of odour are identified during the works, suitable mitigation would be implemented via the CoCP (**ES Appendix 5.3.2** (Doc Ref.5.3)).
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 would 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 with PINS (Table 13.4.1).

Study Area

Construction dust study area

13.5.4 For the assessment of construction dust effects, a study area was defined following the IAQM guidance as 350 metres from any dust generating activity (50 metres for ecological effects) and up to 500 metres along construction road traffic routes from the site entrance(s) (IAQM, 2014). The guidance states that at greater distances *"the level of risk is "negligible", and any effects will be not significant".*

Construction traffic and operational phase study area

13.5.5 In this assessment the term 'wider study area' has been used to refer to the 11 km by 10 km domain plus the modelled ARN outside this area (roads that exceeded the EPUK/IAQM guidance screening criteria) (Figure 13.4.1 4.1.1)

13.5.6 An 11 km by 10 km domain centred on the airport has been assessed to include all roads and airport sources being included to account of all emissions cumulatively within the vicinity of the airport (Figure 13.1.11). The area was selected to take into account the effect of aircraft emissions which 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. Previous modelling assessments at other major UK airports (Heathrow, Luton, Stanstead) have shown that air quality impacts from aircraft and on-airport sources are captured by a study area of this scale. In addition, the Preliminary Environmental Information Report (PEIR) (2021) with a full air quality modelling study was prepared for the Project which has been through statutory consultation (2021) and technical consultation with stakeholders. Both consultations demonstrated the area being assessed was more than adequate in terms of identifying any potential significant effects.

13.5.7 The ARN includes all roads in the operational and construction traffic model which are predicted to exceed the EPUK/IAQM guidance screening criteria due to the Project (IAQM and EPUK, 2017). The following criteria were assessed against:

- a change of Light Duty Vehicle (LDV) flows of more than 100 Annual Average Daily Traffic (AADT) movements within or adjacent to an AQMA, or more than 500 AADT elsewhere;
- a change of Heavy-Duty Vehicle (HDV) flows of more than 25 AADT movements within or adjacent to an AQMA, or more than 100 AADT elsewhere;
- a change of 5m or more in the realignment of a road and the road is within an AQMA; or
- the introduction or removal of a junction near relevant receptors which cause traffic to significantly change vehicle accelerate/decelerate, eg traffic lights, or roundabouts.

13.5.8 Sensitive receptors within 200 metres of the ARN have been assessed. Additional roads within 200 metres of the sensitive receptors and motorways and large A-roads within 500 metres of the sensitive receptors have been added in the assessment to account for all relevant emissions.

13.5.9 Not all roads included in the traffic model in the 11km by 10km study area are expected to experience changes of the magnitude detailed above. However, for the modelling to be more complete, roads within the 11km by 10km study area that do not satisfy the IAQM/EPUK criteria have been included.

13.5.10 Pollutant concentrations have been predicted at discrete sensitive human and ecological receptors within the wider study area. The wider study area was used for the assessment of construction and operational traffic emissions.

Identification of Sensitive Receptors

13.5.11 For the assessment of construction dust in the 2024 and 2029 construction scenarios, the identification of receptors and their sensitivity to dust effects follows IAQM guidance (IAQM, 2014). All sensitive receptors have been considered and all receptors included in the IAQM guidance such as parks (eg Riverside Gardens), businesses such as car show rooms, food preparation areas and any areas where dust could affect the amenity have been assessed.

13.5.12 For the operational assessment 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, 2022) 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).

13.5.13 The sensitive receptors included in the model across the wider study area have been selected as representative of worst case (most sensitive) locations along modelled roads, junctions, or airport sources. A total of 1783 representative sensitive human receptors were selected (this includes 284 schools/nurseries, 381 hospitals/care homes, 903 residential dwellings, 134 committed developments, and 81 receptors requested by RBBC). On airport receptors (hotels, offices and passengers) have been considered by reviewing the outputs of contour mapping and comparing against the relevant short-term objectives as defined in Table 13.2.2. The receptor IDs used (detailed in **ES Appendix 13.6.2: Air Quality Receptors** (Doc Ref.5.3)) are preceded with letters which correspond to their type:

- E = Ecological
- M = Monitoring
- EHO = RBBC requested receptors
- CD = Committed Development
- P = Pollution Climate Mapping (PCM) / Compliance
- E = Education (Human Receptor)
- H = Healthcare (Human Receptor)
- R = Residential (Human Receptor)

13.5.14 Sensitive ecological receptors are defined as those sites whose features could be sensitive to air pollution, 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 included both statutory and non-statutory sites in the wider study area.

13.5.15 Further details and the locations of human and ecological sensitive receptors are presented in **ES Appendix 13.6.2: Air Quality Receptors** (Doc Ref.5.3).

Methodology for Baseline Studies

13.5.16 This section outlines the methodology for determining the current baseline environment.

Desk Study

13.5.17 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, road/air/airside traffic and natural sources.

13.5.18 To provide an assessment of the significance of any new development proposal (in terms of air quality), it is necessary to identify and understand the baseline air quality conditions in and around the study area. The baseline year for this assessment is 2018 (this is selected based on traffic data and monitoring data availability). This provides a reference level against which any potential changes in air quality can be assessed. Future years 2020 and 2021 with available data are not considered representative due to the impact of COVID-19 lockdown periods on air quality.

Since the baseline air quality is predicted to change in the future (mainly because vehicle emissions are changing and aircraft future fleets are expected to change), the future baseline situation has also been predicted for assessment in the construction period (2024 and 2029) and operational period (2029, 2032 and 2038) to present a reasonable worst-case assessment. The do-minimum (DM) scenario is the predicted future baseline for the relevant assessment years without the Project and includes any other proposed schemes which are anticipated to be built. Details of future baseline are provided in **ES Appendix 13.9.1: Air Quality Results Tables and Figures** (Doc Ref.5.3), including those for sensitivity scenarios, provided in **ES Appendix 13.9.2: Sensitivity Tests** (Doc Ref.5.3).

13.5.19 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, 2022c);
- data from monitoring surveys carried out for the Project and by the local planning authorities (**ES Appendix 13.6.1: Air Quality Data and Model Verification** (Doc Ref.5.3));
- the Pollution Inventory website (Environment Agency, 2022);
- Geographical Information Systems (GIS) boundaries of designated ecological sites (Natural England, 2022);
- background UK emissions data (National Atmospheric Emissions Inventory (NAEI), 2022); and
- the Air Pollution Information System (APIS) website (Centre for Ecology and Hydrology, 2022).

Gatwick Monitoring

13.5.20 A monitoring survey was undertaken by GAL to supplement the monitoring surveys carried out by RBBC and CBC. 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 monthly at key areas of concern around the airport. The results of this monitoring survey were used in the model verification. Model verification was used to compare modelled pollutant with measured real world concentrations in 2018 (year of the traffic data baseline data) to assess the performance of the model and determine adjustment factors where required. Further information on the measurements, verification and the site locations are provided in **ES Appendix 13.6.1: Air Quality Data and Model Verification** (Doc Ref.5.3).

Assessment Criteria and Assignment of Significance

13.5.21 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 minimise any potential adverse effects on air quality.

13.5.22 Emissions of NO_x, PM_{10}, $PM_{2.5}$, and NH_3 were calculated from road and aircraft sources. In addition, CO, SO_2 and VOC emissions have been calculated from the CARE facility 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 (for ecological

assessment). Full details of the methodology, including relevant assumptions and limitations can be found in **ES Appendix 13.4.1: Air Quality Assessment Methodology** (Doc Ref.5.3).

Assessment Scenarios

13.5.23 The following assessment years and scenarios have been included in the air quality assessment:

- 2018 current baseline;
- 2024 future baseline without the Project;
- 2024-2029 construction period for airfield works;
- 2029 future baseline without the Project;
- 2029-2032 construction period for surface access improvements;
- 2029 first full year of the Project opening;
- 2032 future baseline without the Project;
- 2032 interim assessment year of the Project;
- 2038 design year without the Project;
- 2038 design year of the Project; and
- 2047 emissions inventory, with and without the Project.

13.5.24 The 2024-2029 and 2029-2032 construction scenarios are both assessed with the peak activity in those years being assumed to occur in the first full year of works (2024 and 2029). Further detail and justification are provided in the assumptions and limitations (section 13.6). Due to the project phasing there are two 2029 assessment scenarios, one for construction and one for operational.

13.5.25 The 2029 construction scenario is cumulative and includes all construction vehicles and operational phase growth expected to occur as a result of expansion. It should be noted the 2029 first full year of Project opening only includes operational traffic. The construction and operational scenarios should be treated separately as there are differences in how the regional traffic model assigns trips over the area during each phase of work (ie there are spatial differences in the traffic flows in each scenario). Having the two assessments allows GAL to understand the impact during peak construction and during operation.

13.5.26 The following assessment years and scenarios include a slow fleet transition (SFT) case[3], based on the assumption that the rate of transition of Gatwick's airline fleet is slower than the Northern Runway Project and Baseline cases with the same number of passenger and aircraft movements:

- 2029 first full year of the Project opening;
- 2032 interim assessment year of the Project; and
- 2038 design year of the Project.

Significance Criteria

Construction Period

13.5.27 Construction period significance has been determined following the IQAM guidance (IAQM, 2014) for construction dust and following the EPUK/IAQM guidance (IAQM and EPUK, 2017) for construction traffic impacts and impacts from NRMM. The method for assessment for significant

[3] No SFT scenario for 2047 is required as it is assumed all aircraft will be new generation by this date.

of construction dust is detailed in this section and to avoid repetition the traffic and NRMM method is detailed in Section 13.5.29.

13.5.28 The IAQM guidance provides a method for identifying the risk of the Project resulting in dust soiling or human health effects. Where any risk higher than a negligible effect is identified the guidance sets out recommended mitigation measures. With the implementation of best practice mitigation measures as detailed in the CoCP (**ES Appendix 5.3.2** (Doc Ref.5.3)) the IAQM guidance notes that effects can be reduced to a negligible level, and hence impacts would be considered to be not significant.

Operational Period

Assessment of Impact at Human Receptors

13.5.29 The magnitude of impact at each of the human 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.

13.5.30 In accordance with the EPUK/IAQM guidance (IAQM and EPUK, 2017) the impact descriptors used in this assessment (for both construction and operation) are set out in Table 13.5.3. 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. Impact descriptors are determined based on the magnitude of incremental change in pollutant concentrations as a proportion of the relevant assessment level; in this instance the air quality standards. The change is then examined in relation to the predicted total pollutant concentrations in the assessment year and its relationship with the relevant air quality standard (Table 13.5.3). The table is used, as intended, by rounding the change in percentage pollutant concentration to whole numbers to make it clear which cell the impact falls within.

Significance of Effect

13.5.31 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.

13.5.32 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.

13.5.33 With regards to the short term NO_2 standard, as defined in Table 13.2.2, LAQM TG(22) (Defra, 2022) discusses the relationship between annual mean and hourly mean NO_2 concentrations. It is considered that where annual mean NO_2 concentrations are lower than 60µg/m^3, it is unlikely that the hourly mean NO_2 standard would be exceeded.

13.5.34 The updated $PM_{2.5}$ standards have recently been confirmed by Defra including the introduction of a legal target of 10µg/m^3 to be met by 2040, an interim target of 12µg/m^3 to be met by 2028 and related exposure reduction targets (UK Government, 2023a). The Government have confirmed they will provide guidance in future regarding how to assess against the new standards for planning matters, however this is not yet available (DLUHC, 2023). As such, and pending the production of such guidance, in order to report significance for the purposes of this assessment, the current EPUK/IAQM guidance with the interim target of 12 µg/m^3 has been used. This is considered appropriate as the updated, long-term 10µg/m^3 target applies from 2040 only and so the existing interim target of 12 µg/m^3 is considered more appropriate when considering the assessment years informing this assessment (2029, 2032, 2038). Whilst it is acknowledged that 2038 is closer in proximity to 2040, due to the challenges of modelling concentrations of $PM_{2.5}$ especially for a future date (as noted by DLUHC), the interim target is still considered appropriate in the circumstances, particularly considering the conservative assumptions already being applied in the assessment such as background values being frozen to 2030 and no improvements in aircraft emissions being accounted for in the air quality modelling.

Table 13.5.3: Assessment Matrix for long term concentrations

Long term average Concentration at receptor in assessment year	% Change in concentration relative to Air Quality Standard			
	1%	2-5%	6-10%	>10%
75% or less of Air Quality Standard	Negligible	Negligible	Slight	Moderate
76-94% of Air Quality Standard	Negligible	Slight	Moderate	Moderate
95-102% of Air Quality Standard	Slight	Moderate	Moderate	Substantial
103-109% of Air Quality Standard	Moderate	Moderate	Substantial	Substantial
110% or more of Air Quality Standard	Moderate	Substantial	Substantial	Substantial

Assessment of impact at ecological receptors

13.5.35 The methodology for the assessment of significance follows the IAQM and Natural England guidance documents (IAQM, 2020) (Natural England, 2018).

13.5.36 Annual mean NO_x concentrations were predicted and compared against the long-term air quality standard (30 µg/m^3).

13.5.37 For ecological sites, where NO_x concentrations are predicted to be below the air quality standard, no significant effects would be anticipated.

13.5.38 A further assessment has been undertaken for ecological receptors to predict the change in nitrogen and acid deposition as a result of the Project for those receptors at which NO_x concentrations are above the air quality standard of 30 µg/m^3. Nitrogen and acid deposition rates, ammonia background concentrations 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) in consultation with the Project ecologists. For ecological sites, where changes are greater than 1% of the critical level/ lower critical load, the assessment of effects have been considered in **ES chapter 9: Ecology and Nature Conservation** (Doc Ref.5.1) to determine significance.

13.5.39 The acid deposition assessment looked at the Critical Load Functions (CLFs) for acidity using the graphs on the APIS website. Acid deposition is assessed in terms of the CLFs for acidity, which are a function of nitrogen and sulphur deposition. The total nitrogen deposition was used to derive CLF graphs for the sites considered in the HRA. The CLF graphs are provided in **ES Appendix 13.9.1: Air Quality Results Tables and Figures P4-P6** (Doc Ref.5.3).

13.5.40 Ammonia emissions from road traffic can also affect the nitrogen deposition at ecological sites. There is no guidance currently on the assessment of ammonia emissions and there are no government assessment tools. National Highways has developed a tool to account for the additional contribution of ammonia (NH_3) emissions from vehicles to deposited nitrogen (National Highways, 2022). This has been used to determine the nitrogen deposition contribution from road vehicle ammonia emissions at designated ecological sites assessed. Ammonia is only emitted from road vehicles as a by-product of the diesel engine gas treatment; it is not emitted from aircraft engines. For an assessment of nitrogen deposition, NO_x 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);
- 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); and
- the nitrogen contribution calculated from road vehicle ammonia emissions (using the National Highways tool) was also added to get the total nitrogen deposition.

13.5.41 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 (IAQM, 2020) (Natural England, 2018).

13.5.42 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.

13.5.43 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 NO_x concentrations has also not been assessed since the long-term critical loads are the key determinants of impact on the ecological sites.

Construction Assessment Methodology

Construction Dust Assessment

13.5.44 The effects from demolition and construction of the Project have been assessed using the qualitative approach described in the latest guidance by the IAQM (IAQM, 2014). The construction dust assessment has been carried out following a conservative approach, assuming all construction activities take place in the same time period.

13.5.45 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.

13.5.46 The IAQM guidance considers the potential for dust emissions from activities such as demolition of existing structures, earthworks, construction of new structures and trackout (IAQM, 2014). Earthworks refer to the processes of soil stripping, ground levelling, excavation and land scaping, 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.

13.5.47 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.

13.5.48 The receptors can be human or ecological and are chosen based on their sensitivity to dust soiling and PM_{10} exposure.

13.5.49 The methodology takes into account the scale on which the above effects are predicted to be generated (classed as small, medium or large), the levels of background PM_{10} concentration and the distance to the closest receptor, in order to determine the sensitivity of the area. This is then taken into consideration when deriving the overall risk for the Project. Suitable mitigation measures are also proposed to reduce the risk of the Project. Significance is assessed following the determination of residual risk after mitigation is applied.

13.5.50 The full methodology for the assessment of construction dust emissions, including tables to describe the sensitivity and magnitude, is detailed in **ES Appendix 13.4.1: Air Quality Assessment Methodology** (Doc Ref.5.3).

Construction Traffic Assessment

13.5.51 Changes to air pollutant concentrations as a result of additional vehicles associated with airfield and highways construction the highway network have been predicted using the Atmospheric Dispersion Modelling System (ADMS) ADMS-Airport (version 5.0.0.1).

13.5.52 Indicative construction sequencing information has been made available; this shows that construction activities will take place between 2024 and 2038. Activities associated with the airfield construction works will take place between 2024 and 2029, including reconfiguration of taxiways, terminal extensions and construction of car parks. The 2024-2029 construction scenario for the airfield work has assumed the peak construction traffic flows applied to the first year of construction (2024) as a conservative assumption since emissions and background concentrations are anticipated to improve in future years.

13.5.53 Activities associated with the highways construction works include the improvements to surface access, which are planned between 2029 and 2032. The 2029-2032 construction scenario for the surface access improvements has assumed the peak construction flows applied to the first year of this period (2029) as a conservative assumption 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 and the operational traffic data and the scenario considers the traffic contribution from the 2029 assessment year scenario. This scenario has focused on the effects of road traffic emissions. The airport contribution has been assumed to be the same as in the 2029 (first full year of the Project opening) assessment year scenario.

13.5.54 Full details of the modelling methodology and calculations of emissions, and any assumptions and limitations, are provided in **ES Appendix 13.4.1: Air Quality Assessment Methodology** (Doc Ref. 5.3).

Construction Equipment and Plant

13.5.55 There will be construction equipment used such as Non-Road Mobile Machinery (NRMM) and a proposed concrete batching plant, which will have related emissions of NO_x, PM_{10} and $PM_{2.5}$. ADMS-Airport has been used for the assessment of emissions from NRMM equipment and concrete batching plants. The NRMM and batching plant impacts will be sufficiently mitigated by measures including, but not limited to, locating away from sensitive receptors (Code of Construction Practice (CoCP) provided as **ES Appendix 5.3.2** (Doc Ref.5.3), increasing the release height of emissions for sufficient dispersion (if necessary), and relevant abatement technology. NRMM and concrete batching plant emissions have been assessed. Full details of the modelling methodology and calculations of emissions, and any assumptions and limitations, are provided in **ES Appendix 13.4.1: Air Quality Assessment Methodology** (Doc Ref.5.3).

Operational Assessment Methodology

13.5.56 A review of sources and emissions associated with the existing baseline conditions and the operation of the Project has 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 period 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);
- vehicles at car parks; and
- the CARE facility.

13.5.57 The ADMS-Airport and ADMS 5 dispersion models have 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. Any required adjustment was then undertaken in accordance with Defra guidance (Defra, 2022). The model verification results are detailed in **ES Appendix 13.6.1: Air Quality Data and Model Verification** (Doc Ref. 5.3).

13.5.58 Pollutant concentrations have been predicted at a grid of receptors covering the 10km x 11km study area, and at discrete sensitive human and ecological receptors in the study area.

13.5.59 A plume visibility study has been carried out for the CARE facility and results provided to the landscape team for discussion in **ES Chapter 8: Landscape, Townscape and Visual Resources** (Doc Ref. 5.1).

13.5.60 Full details of the modelling methodology and calculations of emissions, and any assumptions and limitations, are provided in **ES Appendix 13.4.1: Air Quality Assessment Methodology** (Doc Ref. 5.3).

13.5.61 The significance of effects has been calculated using the approach described in the IAQM/EPUK guidance (IAQM and EPUK, 2017), the approach is detailed in Section 13.5.29.

Compliance Risk Assessment

13.5.62 The Design Manual for Roads and Bridges guidance (DMRB LA 105) (Highways England, 2019) provides a method for the assessment of the risk of the compliance of a scheme against air quality standards. The compliance risk assessment is undertaken using the modelling results from the local air quality assessment. To undertake compliance risk assessment, the following information is required:

- Local air quality modelled results;
- Defra's PCM model outputs for the compliance road network (Department for Environment Food & Rural Affairs, 2019a); and
- Defra's zones and agglomerations maps (Department for Environment Food & Rural Affairs, 2019a).

13.5.63 Defra uses the PCM model to report against compliance. The current PCM model results have concentrations predicted for each year between 2017 and 2030.

13.5.64 To determine the study area for the compliance risk assessment the local air quality study area is compared to the compliance link locations in the PCM model. Where the two networks intersect these links form the basis of the assessment of compliance risk.

13.5.65 A review was carried out to identify any qualifying features such as footpaths, residential properties and schools as defined in Section 2.64 of DMRB LA 105, in which features have to be within 15 metres of the running lane/ kerbside (but not within 25m of a junction). Once identified, these locations have been added as the compliance receptors. 180 compliance receptors have been added along the PCM links and corresponding validation points (four metres away from the identified receptors) were also added. Details of the receptors are provided in **ES Appendix 13.6.2: Air Quality Receptors** (Doc Ref. 5.3).

13.5.66 To determine the compliance risk of the scheme, the Compliance Risk Flow Chart in Figure 2.79 of DMRB LA 105 has been followed. Under each assessment scenario commentary has been made on whether the predicted concentrations are expected to impact compliance with the air quality standards.

Odour Assessment Methodology

13.5.67 Different sources of odour would affect receptors over different distances due to the varying strength and nature of emissions. An assessment has been carried out for all odour sources identified that could potentially have an impact on receptors (during the construction and operation periods).

13.5.68 Where any potential sources of odour are identified during the construction works in relation to ground excavation odour or plant equipment emissions suitable mitigation would be implemented via the **CoCP** (**ES Appendix 5.3.2** (Doc Ref. 5.3)). However, no odorous materials are expected to be excavated during construction of the Project. Large amounts of putrescible waste are not indicated to be present on the Project site that would likely give rise to significant odour issues. A list of potential contamination areas which have the potential to produce odours is provided in **ES Chapter 10: Geology and Ground conditions** (Doc Ref. 5.1).

13.5.69 During the operational period aircraft emissions would be one of the key sources of odour. There is limited published information regarding the odour potential for volatile organic compound (VOC) emissions from aircraft engines that could potentially assist in the evaluation of potential odour annoyance. Odour perception and its potential to cause annoyance is also subjective and strongly dependent on the nature of the odour, the sensitivity or tolerance of those exposed and meteorological conditions.

13.5.70 Therefore, in accordance with IAQM guidance (IAQM,2018), the assessment of odour under operational scenarios has been undertaken using a Source Pathway Receptor assessment and a review of complaint data. This allowed the pathway odour flux to receptor (eg distance and direction in relation to prevailing wind direction) and receptor sensitivity to be considered for the Project.

13.5.71 The methodology is detailed in **ES Appendix 13.4.1: Air Quality Assessment Methodology** (Doc Ref.5.3).

Health Impact Assessment Methodology

13.5.72 It is acknowledged that there are no thresholds of effect at a population level identified for pollutants such as NO_2, PM_{10} and $PM_{2.5}$ (Public Health England, 2019), so there are health benefits to be gained from improving air quality even at concentrations below the standards. To determine the significance of impacts, the current legislated standards have been used, in line with the best practice EPUK/IAQM guidance (IAQM and EPUK, 2017). Health impact assessments consider the impacts at a population level, in comparison to this air quality assessment which considers the population affected by significant concentrations by assessing the impact at sensitive receptors representative of the population (receptors nearest to the ARN, airport and below the flightpath). The assessment of population health impacts has been further considered in **ES Chapter 18: Health and Wellbeing** (Doc Ref. 5.1), with the methodology described in that chapter.

13.6. Assumptions and Limitations of the Assessment

13.6.1 Full details of the assumptions and limitations of the air quality assessment are provided in Table 7.1 of **ES Appendix 13.4.1: Air Quality Assessment Methodology** (Doc Ref. 5.3). The ES assessment describes the approach adopted to ensure that a reasonable worst case is assumed

in this assessment. The approach taken is considered to provide a robust assessment based on the data available at the time of the preparation of the ES. The following provides the relevant assumptions specific to this assessment.

Construction Period

13.6.2 Due to the dynamic nature of construction activities, the assessment of the construction period traffic emissions are based on the peak year of construction traffic that will occur in the airfield and surface access construction periods. The construction period effects are assessed based on the volumes determined within the transport chapter (**ES Chapter 12: Traffic and Transport** (Doc Ref. 5.1)).

13.6.3 The construction traffic assessment methodology are outlined in this chapter (13.5.52 – 13.5.53). Traffic flows have been applied to the first years of construction (2024 and 2029, respectively) as a conservative assumption since emissions and background concentrations are anticipated to improve in future years.

13.6.4 NRMM emissions will occur across the site, to apply a conservative assumption all activities are assumed to take place at the same time and emissions have been located within their activity areas. The emissions have been added to the construction periods (2024-2029 and 2029-2032). A conservative approach has been taken regarding construction phase NRMM, for example all NRMM has been assessed as being Euro Stage V diesel standards, however as noted in Table 13.9.1 the Project commits to using low or zero emissions equipment where possible.

Operational Period

13.6.5 The methodology for calculating future road traffic emissions are outlined in this chapter (13.5.56-13.5.61). The operational period effects are assessed based on the volumes determined within the transport chapter (**ES Chapter 12: Traffic and Transport** (Doc Ref.5.1)).

13.6.6 Since baseline air quality is predicted to change in the future, the future baseline situation has been predicted for the operational periods (2029, 2032 and 2038) to present a reasonable worst-case assessment. The operational future baseline does not include construction works.

13.6.7 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 aircraft metrics used in this assessment are based on what is considered today to be the most likely rate of fleet transition and are detailed in **ES Appendix 13.4.1: Air Quality Assessment Methodology** (Doc Ref.5.3).

13.6.8 A sensitivity test of a slower transition fleet has been undertaken in this ES, presented in **ES Appendix 13.9.2: Sensitivity Tests** (Doc Ref.5.3).

13.7. Baseline Environment

Current Baseline Conditions

Local Air Quality Management

13.7.1 There are two AQMAs (declared by CBC and RBBC in their administrative areas) within the 11 km by 10 km domain centred on the airport.

13.7.2 The Horley AQMA (amended to AQMA No.3 in 2003) was declared by RBBC 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 CBC 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. In March 2022 the Hazelwick AQMA was extended to "*include the Three Bridges area, forming a single extended 'Crawley AQMA*" (Crawley, 2021). This added an additional area onto the south eastern 'arm' of the current AQMA.

13.7.3 Both AQMAs have been designated for exceedances of the annual mean NO_2 air quality standard and their locations are presented in Figure 13.1.11. 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 is detailed in **ES Appendix 13.9.1: Air Quality Results Tables and Figures P1-2 and P4-6** (Doc Ref. 5.3).

Local Monitoring Data

13.7.4 There are five continuous monitoring sites currently in operation within the 11 km by 10 km domain centred on Gatwick and a wide network of diffusion tubes operated by the local planning authorities (Figure 13.1.12). 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 seven-year period from 2015 to 2021 are presented in Table 13.7.1. Monitoring data for 2022 are not yet available at the time of writing and years 2020 and 2021 are not considered representative due to the impact of COVID-19 lockdown periods on air quality. It can be observed that annual mean NO_2 concentrations over the five-year period 2015 to 2019 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.

13.7.5 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 recorded exceedances of the air quality standard in recent monitoring data up to and including monitoring data for the year 2019. 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. These sites are located in AQMAs declared for the exceedances of the annual mean air quality standard measured at roadside locations. It is typical for roadside locations adjacent to major roads in urban areas to exceed the air quality standard for NO_2 due to the proximity to traffic emissions. Full details of the diffusion tube monitoring survey results are presented in **ES Appendix 13.6.1: Air Quality Data and Model Verification** (Doc Ref. 5.3).

13.7.6 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 13.7.1) and there were also no exceedances of the 24-hour mean standard of 50 µg/m^3 at any of the sites.

13.7.7 Measurements of $PM_{2.5}$ concentrations are undertaken at the CA2 and LGW3 continuous monitoring sites near the airport. Measurements of $PM_{2.5}$ are below the future air quality standards (annual mean) given in Table 13.2.2.

Table 13.7.1: Continuous Monitoring Data

Site	2015	2016	2017	2018	2019	2020	2021
Annual mean NO_2 ($\mu g/m^3$)							
RG1 Horley	21.1	20.3	20.4	18.8	19.1	13.1	15.4
RG2 Horley South East**	26.4	28.7	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*
RG6 Horley South East**	*N/A*	28.3**	26.7	24.9	24.2	9.7	9.7
RG3 Poles Lane	14.0	16.7	13.9	15.5	15.1	14.6	13.8
CA2 Gatwick East	22.0	29.0	28.0	25.0	25.0	17.0	18.0
LGW3 Airport	30.0	30.0	29.0	30.0	29.0	17.0	18.0
Annual mean PM_{10} ($\mu g/m^3$)							
RG1 Horley	19.2	16.5	16.2	17.1	15.9	*N/A*	*N/A*
CA2 Gatwick East	15.0*	18.0*	18.0*	18.0*	21.0*	15.0	*18.0*
LGW3 Airport	22.0	17.0	19.0	19.0	14.0	14.0	*14.0*
Annual mean $PM_{2.5}$ ($\mu g/m^3$)							
RG1 Horley	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*
CA2 Gatwick East	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	8.0	*8.0*
LGW3 Airport	*N/A*	*N/A*	*N/A*	8.0	9.0	8.0	*9.0*

* 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 Pollutant Concentrations

13.7.8 The Defra website (Defra, 2021c) includes estimated background air pollution concentrations for NO_x, PM_{10} and $PM_{2.5}$ for each 1 km by 1 km OS grid square in the UK. The data is 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) and design year (2038).

13.7.9 The Defra background concentrations for SO_2 would change very little at locations being away from industrial sources, explained by Defra, as such 2001 background concentrations have been used in 2024, 2029, 2032, and 2038. Defra background concentrations have also been used for CO and VOCs, these concentrations have been adjusted to 2025 which is the year with the latest available adjustment factor for these pollutants.

13.7.10 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 for NO_x, PM_{10} and $PM_{2.5}$ 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.

13.7.11 A comparison of relevant locally monitored background concentrations was undertaken against the latest year of available Defra modelled data. The relevant Defra background concentrations used for the comparison are presented in **ES Appendix 13.6.1: Air Quality Data and Model Verification** (Doc Ref. 5.3). The comparison shows good agreement between the Defra modelled and monitored concentrations, giving confidence in the use of Defra mapped estimates.

Baseline Emissions Inventory

13.7.12 Table 13.7.2 presents a summary of the estimated annual NO_x, PM_{10} and $PM_{2.5}$ emissions for the baseline year of 2018 for all sources across the study area.

13.7.13 Emissions have been estimated to be 7,264 t/yr for NO_x, 390 t/yr for PM_{10} and 254 t/yr for $PM_{2.5}$ in the existing 2018 baseline scenario. Airport-related emissions have been estimated to be 2,061 t/yr for NO_x, 50 t/yr for PM_{10} and 35 t/yr for $PM_{2.5}$. It can be observed that the largest emission source for NO_x, PM_{10} and $PM_{2.5}$ is non-airport road vehicles. This is due to the large extent of the road network modelled, encompassing the ARN for all modelled scenarios.

Table 13.7.2: Summary of Annual Pollutant Emissions for the 2018 Baseline

Source	NO_x (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	0.03	0.03
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	0.006	0.006
Ground equipment			
GSE	34.5	3.2	1.8
Fixed plant			
Fire training ground	0.1	0.003	0.003
Energy plant	25.8	0.2	0.2
CARE facility	N/A	N/A	N/A
Car parks			
Car parks	4.1	0.3	0.2
Roads			
Airport	422.5	29.2	18.9
Non-airport	5202.8	340.8	219.3
Total (all sources)	**7,264**	**390**	**254**
Total (airport-related)	**2,061**	**50**	**35**

Future Baseline Conditions

13.7.14 This section presents the background pollutant concentrations and emission inventories for the future assessment years. 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 (**ES Chapter 4: Existing Site and Operation** (Doc Ref. 5.1)).

Future Background Pollutant Concentrations

13.7.15 Background concentrations for the future assessment years were obtained from the Defra background maps. The Defra background maps include estimated background air pollutant concentrations for each 1 km by 1 km grid square in the UK up to the year 2030. The background concentrations used for years beyond 2030, for the 2032 and 2038 assessments assumed that background concentrations were frozen at 2030 levels. This presents a conservative assumption for future years as backgrounds would be expected to reduce with technology improvements and take up of electric vehicles. The background concentrations used in the assessment are presented in **ES Appendix 13.4.1: Air Quality Assessment Methodology** (Doc Ref. 5.3).

Future Road Traffic Emissions

13.7.16 Road traffic emissions for the future assessment years were obtained from the Defra Emissions Factor Toolkit (EFT version 11) (Defra, 2021). The EFT provides the latest predictions for vehicle emission rates and vehicle split composition data up to 2050 for England (not London) roads and up to 2030 for London roads. Therefore, for the 2032, 2038 and 2047 assessment years, the corresponding emissions data were used for England (non-London) roads and for London roads 2030 emissions were used (eg the M25 is considered to be a 'London' road). This is likely to be a conservative approach, since road traffic emissions are anticipated to improve in future years due to changes in fleet composition, which will be necessary to meet the trajectory of carbon reduction set out in the Transport Decarbonisation Plan (Department for Transport, 2021). The introduction of cleaner vehicles in the fleet and increased uptake of electric vehicles will be required to ensure that the Government's commitments to net zero are met. In addition, the proportions of electric vehicles have been revised upwards since EFT version 11 was released as part of the TAG Databook and therefore this adds to the demonstration of a conservative assessment.

13.7.17 The Transport Decarbonisation Plan (Department for Transport, 2021) provides an indication of the rate of uptake of cleaner vehicles. The Transport Decarbonisation Plan has not been quantitatively assessed however a qualitative review of impacts is provided in **ES Appendix 13.9.2: Sensitivity Tests** (Doc Ref.5.3). The Transport Decarbonisation Plan would result in reduced emissions compared to those assessed in the ES.

Construction Period: 2024 Emissions Inventory

13.7.18 Table 13.7.3 presents a summary of the estimated annual NO_x, PM_{10} and $PM_{2.5}$ emissions for the construction period of 2024 for all sources across the study area without the Project in place.

13.7.19 Emissions have been estimated to be 4,612 t/yr for NO_x, 293 t/yr for PM_{10} and ~~178~~ 180 t/yr for $PM_{2.5}$ in the construction 2024 scenario. Airport-related emissions have been estimated to be 2,122 t/yr for NO_x, 45 t/yr for PM_{10} and ~~29~~ 31 t/yr for $PM_{2.5}$. It can be observed that the largest emission source for NO_x, PM_{10} and $PM_{2.5}$ is non-airport road vehicles. This is due to the large extent of the road network modelled, encompassing the ARN for all modelled scenarios.

Table 13.7.3: Summary of Annual Pollutant Emissions for the 2024 Construction Period (Without Project)

Source	NO_x (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	166.2	2.4	2.4
Hold	76.4	1.1	1.1
Take-off	422.8	1.4	1.4
Brake & tyre wear	N/A	6.6	3.3
APUs	71.1	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	26.2	0.2	0.2
CARE facility	N/A	N/A	N/A
Car parks			
Car parks	2.7	0.3	0.2
Roads			
Airport	259.5	24.2	14.8
Non-airport	2489.9	248.0	149.3
Total (all sources)	**4,612**	**293**	**180~~178~~**
Total (airport-related)	**2,122**	**45**	**31~~29~~**

Construction Period: 2029 Emissions Inventory

13.7.20 Table 13.7.4 presents a summary of the estimated annual NO_x, PM_{10} and $PM_{2.5}$ emissions for the construction period of 2029 for all sources across the study area without the Project in place.

13.7.21 Emissions have been estimated to be 3,491 t/yr for NO_x, 286 t/yr for PM_{10} and 172 t/yr for $PM_{2.5}$ in the construction 2029 scenario. Airport-related emissions have been estimated to be 2,022 t/yr for NO_x, 44 t/yr for PM_{10} and 29 t/yr for $PM_{2.5}$. It can be observed that the largest emission source for

NO_x, PM_{10} and $PM_{2.5}$ is non-airport road vehicles. This is due to the large extent of the road network modelled, encompassing the ARN for all modelled scenarios.

Table 13.7.4: Summary of Annual Pollutant Emissions for the 2029 Construction Period (Without Project)

Source	NO_x (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	166.2	2.4	2.4
Hold	76.4	1.1	1.1
Take-off	422.8	1.4	1.4
Brake & tyre wear	N/A	6.6	3.3
APUs	71.1	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	26.2	0.2	0.2
CARE facility	N/A	N/A	N/A
Car parks			
Car parks	2.7	0.3	0.2
Roads			
Airport	159.0	23.6	14.2
Non-airport	1469.0	241.7	143.0
Total (all sources)	**3,491**	**286**	**172**
Total (airport-related)	**2,022**	**44**	**29**

First Full Year of Opening: 2029 Emissions Inventory

13.7.22 Table 13.7.5 presents a summary of the estimated annual NO_x, PM_{10} and $PM_{2.5}$ emissions for the future baseline year of 2029 for all sources across the study area without the Project in place.

13.7.23 Emissions have been estimated to be 3,337 t/yr for NO_x, 291 t/yr for PM_{10} and 176 t/yr for $PM_{2.5}$ in the future 2029 baseline scenario. Airport-related emissions have been estimated to be

21,959 t/yr for NO_x, 43 t/yr for PM_{10} and 29 t/yr for $PM_{2.5}$. It can be observed that the largest emission source for NO_x, PM_{10} and $PM_{2.5}$ is non-airport road vehicles. This is due to the large extent of the road network modelled, encompassing the ARN for all modelled scenarios.

Table 13.7.5: Summary of Annual Pollutant Emissions for the 2029 Future Baseline (Without Project)

Source	NO_x (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	166.2	2.4	2.4
Hold	76.4	1.1	1.1
Take-off	422.8	1.4	1.4
Brake & tyre wear	N/A	6.6	3.3
APUs	71.1	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	26.2	0.2	0.2
CARE facility	N/A	N/A	N/A
Car parks			
Car parks	2.7	0.3	0.2
Roads			
Airport	161.7	22.3	14.2
Non-airport	1499.8	242.1	143.4
Total (all sources)	**3,524**	**285**	**174**
Total (airport-related)	**2,025**	**43**	**30**

Interim Assessment Year: 2032 Emissions Inventory

13.7.24 Table 13.7.6 presents a summary of the estimated annual NO_x, PM_{10} and $PM_{2.5}$ emissions for the future baseline year of 2032 for all sources across the study area without the Project in place.

13.7.25 Emissions have been estimated to be 3,337 t/yr for NO_x, 291 t/yr for PM_{10} and 176 t/yr for $PM_{2.5}$ in the future 2032 baseline scenario. Airport-related emissions have been estimated to be 1,959 t/yr for NO_x, 43 t/yr for PM_{10} and 29 t/yr for $PM_{2.5}$. It can be observed that the largest emission source for NO_x, PM_{10} and $PM_{2.5}$ is non-airport road vehicles. This is due to the large extent of the road network modelled, encompassing the ARN for all modelled scenarios.

Table 13.7.6: Summary of Annual Pollutant Emissions for the 2032 Future Baseline (Without Project)

Source	NO_x (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	165.8	2.1	2.1
Hold	75.7	1.0	1.0
Take-off	409.1	1.2	1.2
Brake & tyre wear	N/A	6.8	3.4
APUs	67.3	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	26.5	0.2	0.2
CARE facility	N/A	N/A	N/A
Car parks			
Car parks	2.6	0.3	0.2
Roads			
Airport	146.0	24.0	14.4
Non-airport	1378.2	248.2	146.8
Total (all sources)	**3,337**	**291**	**176**
Total (airport-related)	**1,959**	**43**	**29**

Design Year: 2038 Emissions Inventory

13.7.26 Table 13.7.7 presents a summary of the estimated annual NO_x, PM_{10} and $PM_{2.5}$ emissions for the future baseline year of 2038 for all sources across the study area without the Project in place.

13.7.27 Emissions have been estimated to be 3,301 t/yr for NO_x, 301 t/yr for PM_{10} and 180 t/yr for $PM_{2.5}$ in the future 2038 baseline scenario. Airport-related emissions have been estimated to be 1,936 t/yr for NO_x, 42 t/yr for PM_{10} and 28 t/yr for $PM_{2.5}$. It can be observed that the largest emission source for NO_x, PM_{10} and $PM_{2.5}$ is non-airport road vehicles. This is due to the large extent of the road network modelled, encompassing the ARN for all modelled scenarios.

Table 13.7.7: Summary of Annual Pollutant Emissions of Aircraft Sources for the 2038 Future Baseline (Without Project)

Source	NO_x (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	165.9	1.7	1.7
Hold	75.4	0.8	0.8
Take-off	408.8	0.9	0.9
Brake & tyre wear	N/A	7.0	3.5
APUs	67.6	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	27.1	0.2	0.2
CARE facility	N/A	N/A	N/A
Car parks			
Car parks	2.6	0.3	0.2
Roads			
Airport	139.8	24.7	14.8
Non-airport	1365.0	258.4	152.6
Total (all sources)	**3,301**	**301**	**180**
Total (airport-related)	**1,936**	**42**	**28**

Future Year: 2047 Emissions Inventory

13.7.28 Table 13.7.8 presents a summary of the estimated annual NO_x, PM_{10} and $PM_{2.5}$ emissions for the future baseline year of 2047 for all sources across the study area without the Project in place.

13.7.29 Emissions have been estimated to be 3,402 t/yr for NO_x, 312 t/yr for PM_{10} and 187 t/yr for $PM_{2.5}$ in the future 2047 baseline scenario. Airport-related emissions have been estimated to be 2,069 t/yr for NO_x, 44 t/yr for PM_{10} and 29 t/yr for $PM_{2.5}$. It can be observed that the largest emission source for NO_x, PM_{10} and $PM_{2.5}$ is non-airport road vehicles. This is due to the large extent of the road network modelled, encompassing the ARN for all modelled scenarios.

Table 13.7.8: Summary of Annual Pollutant Emissions of Aircraft Sources for the 2047 Future Baseline (Without Project)

Source	NO_x (t/yr)	PM_{10} (t/yr)	$PM_{2.5}$ (t/yr)
Aircraft in the air			
Approach	244.7	1.3	1.3
Initial climb	375.6	0.7	0.7
Climb out	483.1	1.1	1.1
Aircraft on the ground			
Landing	0.8	<0.1	<0.1
Reverse thrust	15.6	0.1	0.1
Taxiing	174.9	1.8	1.8
Hold	79.4	0.8	0.8
Take-off	446.9	1.0	1.0
Brake & tyre wear	N/A	7.4	3.8
APUs	70.7	1.6	1.6
Engine testing	0.7	<0.1	<0.1
Ground equipment			
GSE	12.0	2.1	1.0
Fixed plant			
Fire training ground	0.1	<0.1	<0.1
Energy plant	28.0	0.2	0.2
CARE facility	N/A	N/A	N/A
Car parks			
Car parks	2.5	0.3	0.2
Roads			
Airport	134.1	26.2	15.6
Non-airport	1333.2	267.6	157.4
Total (all sources)	**3,402**	**312**	**187**

Source	NO_x (t/yr)	PM_{10} (t/yr)	$PM_{2.5}$ (t/yr)
Total (airport-related)	**2,069**	**44**	**29**

13.8. Key Aspects of Project

13.8.1 The assessment has been based on the key aspects identified in **ES Chapter 5: Project Description** (Doc Ref. 5.1). Table 13.8.1 identifies the maximum design scenarios relevant to this assessment. 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 **ES Chapter 5: Project Description** (Doc Ref. 5.1) be taken forward in the final design of the Project.

Table 13.8.1: Maximum Design Scenarios

Potential Impact	Maximum Design Scenario	Justification
Construction Period: 2024-2029 and 2029-2032		
Construction dust soiling and human health risk/impact on ecological receptors	Construction activities have been assumed to potentially occur at all locations within the red line boundary.	Assuming a construction or demolition activity can take place anywhere in the red line boundary provides a conservative assumption and a robust assessment taking into account all potentially affected receptors.
Effects from NRMM to human health and ecology impacts	Effects from construction period emissions area assessed across the entire site based on conservative hours of use. It has been assumed emissions from NRMM occur in all years throughout the construction periods (2024-2029 and 2029-2032).	The conservative approach provides a reasonable worst-case assessment in terms of NRMM emissions.
Construction traffic impacts to human health and ecological impacts	Construction traffic effects are assessed across the study area based on the volumes determined within the transport chapter (**ES Chapter 12: Traffic and Transport** (Doc Ref. 5.1)) and a conservative approach is taken to assessing the worst-case year for each period.	The peak year during each period is assessed at the earliest possible year to provide a conservative result.

Potential Impact	Maximum Design Scenario	Justification
Operational Period		
Inter-related effects from all emission sources	The emissions from background, aircraft, road traffic and point sources such as the energy provision and the CARE facility are assessed together to provide a maximum combined impact of the Project. Further detail of Passenger Air Transport Movements (ATM) forecasts is provided in **ES Chapter 5: Project Description** (Doc Ref. 5.1). Traffic details are provided in **ES Chapter 12: Traffic and Transport** (Doc Ref. 5.1).	The emissions need to be assessed at a combined level to calculate the full effects of the Project.
CARE emissions and effects on human health and ecological impacts	The facility was modelled based on maximum recommended stack height and operational parameters as detailed in **ES Appendix 13.9.1: Air Quality Results Tables and Figures** – P3 (Doc Ref. 5.3).	Modelling was carried out based on the current outline design parameters and stack height assessment.

13.9. Mitigation and Enhancement Measures Adopted as Part of the Project

13.9.1 A number of measures have been included in the Project to reduce the potential for impacts on air quality. Table 13.9.1 provides a summary of these measures adopted as part of the project.

13.9.2 The construction phase includes measures adopted to mitigate and monitor dust and emissions and these are detailed in **ES Appendix 13.8.1: Construction Period Mitigation** (Doc Ref.5.3) and are included in the CoCP (**ES Appendix 5.3.2: CoCP** (Doc Ref. 5.3)).

13.9.3 The operational phase includes measures set out within the Carbon Action Plan (CAP) (**ES Appendix 5.4.2: Carbon Action Plan** (Doc Ref.5.3)) and the Surface Access Commitments (SAC) (**ES Appendix 5.4.**1**: Surface Access Commitments** (Doc Ref.5.3)) which will help to reduce emissions associated with the Project.

13.9.4 A conservative approach to this assessment has been taken with regards to the above embedded operational phase mitigation. The traffic data provided incorporates the Surface Access Commitments (**ES Appendix 5.4.1: Surface Access Commitments** (Doc Ref.5.3)). It should be noted however that there are technical considerations only applied in the GHG (**ES Chapter 16:**

Greenhouse Gases (Doc Ref.5.1)) assessment within the ES, and not within the air quality assessment. These technical considerations are based on the assumptions for the UK aviation industry contained within the Jet Zero High Ambition Scenario and include improvements in aircraft fleet beyond 2038, consideration of sustainable aviation fuel and introductions of zero emission aircraft. Whilst this does result in inconsistency between the chapters it allows the GHG chapter to align with government policy on net zero within the aviation sector whilst allowing other topics including air quality to comply with best practice approaches to deliver a conservative assessment of future impacts.

13.9.5 The CAP seeks to achieve outcomes for carbon reductions. It includes a commitment to achieve net zero GHG emissions for GAL scope 1 and 2 by 2030 and zero emissions by 2040. Even though the commitments relate to GHG emissions, the toolkit of measures in the CAP for achieving these commitments includes measures that would also benefit air quality. It would therefore be expected that total emissions will be lower in the future than those assessed in the air quality assessment, in relation to energy use and airside vehicles.

Table 13.9.1: Mitigation Measures

Measures Adopted as Part of the Project	Justification	How secured
Construction dust mitigation following IAQM best practice	A construction dust assessment has been carried out for the ES to inform appropriate control measures to be deployed during the works. It is recommended that mitigation measures for high-risk activities are considered during all periods of work to minimise dust soiling or human health effects. The appropriate measures are outlined in **ES Appendix 13.8.1: Construction Period Mitigation** (Doc Ref.5.3) and included in the **CoCP** (**ES Appendix 5.3.2: CoCP** (Doc Ref.5.3)). With the application of these mitigation measures, all effects can be reduced to a negligible level.	DCO requirement in Schedule 2 of the DCO (Doc Ref. 2.1)
Use of low or zero emissions construction equipment and vehicles	Low emission plant would be encouraged and used where practicable during construction of the Project to minimise any potential air quality effects.	DCO requirement in Schedule 2 of the DCO (Doc Ref. 2.1)
Management of construction traffic	There is a Construction Traffic Management Plan (CTMP) (see Annex to the Buildability Report **ES Appendix 5.3.1: Buildability Report** (Doc Ref. 5.3)) to reduce construction traffic and minimise impacts on the highway network. Construction traffic routing would direct traffic through the Strategic Road	DCO requirement in Schedule 2 of the DCO (Doc Ref. 2.1)

Measures Adopted as Part of the Project	Justification	How secured
	Network via the M23 Junction 9 in order to avoid any routing through the M23 Junction 10 and Hazelwick Air Quality Management Area. This approach would also minimise construction traffic on local minor routes except where necessary for local supply chain vehicles. The plan excludes local suppliers to allow for efficient routing. The CTMP would also manage delivery scheduling to avoid queuing or idling of vehicles.	
Management of operational traffic	Traffic during operation of the Project would be managed through the Surface Access Commitments (SAC) (**ES Appendix 5.4.1: Surface Access Commitments** (Doc Ref. 5.3)). GAL remains committed to promoting and supporting passengers and staff to use sustainable modes of access to and from Gatwick, for which it commits to achieving increases to increase sustainable transport mode share. The SAC has been developed to accommodate the increase in passenger and staff access to and from Gatwick Airport under dual runway operations.	Future targets are secured via the DCO.
Airport operation	The CAP (**ES Appendix 5.4.2: Carbon Action Plan** (Doc Ref.5.3)) commits to key decarbonisation outcomes and outlines the actions that GAL could take in order to achieve such outcomes and in so doing, play a part in the global transition to a low carbon future for the aviation sector. It includes a list of measures that could be implemented to reduce emissions from on-site activity (airside vehicles, energy and fixed plant and miscellaneous emissions) and aviation (aircraft emissions). GAL is committing to reduce emissions from sources over which it has direct control, and to guide reductions in sources of emissions that it can influence, through engaging and working closely with partners and stakeholders.	The CAP is secured via the DCO.

Measures Adopted as Part of the Project	Justification	How secured
Combustion plant	GAL would continue improving heat generation and supply efficiencies (see the CAP (**ES Appendix 5.4.2: Carbon Action Plan** (Doc Ref. 5.3)).	The CAP is secured via the DCO.
Odour management	The airport would apply best practice handling methods for fuels. Best practice waste handling methodologies would be implemented for the CARE facility.	Existing legislative regimes CoCP (CRWMP) – DCO Requirement (**ES Appendix 5.3.2: CoCP Annex 5 - Construction Resources and Waste Management Plan** (Doc Ref. 5.3))

13.9.6 Additional items to support the mitigation measures such as monitoring of air quality are also proposed as part of the Project and will be secured via the updated section 106 agreement. The details of the additional items are provided below.

Air quality monitoring

Construction phase air quality monitoring

13.9.7 The commitment to provide suitable construction dust monitoring is outlined in **ES Appendix 13.8.1: Construction Period Mitigation** (Doc Ref.5.3) and included in the CoCP **(ES Appendix 5.3.2: CoCP** (Doc Ref.5.3)). Baseline monitoring at least three months prior to the commencement of works would be carried out with suitable automatic (Osiris type) monitoring equipment. Once detailed design plans are available a dust management plan and monitoring plan would be created to determine the location of dust monitors and detailed plans for monitoring during the phasing of the construction activities. Monitoring would be carried out to confirm that the applied mitigation measures are effective in controlling dust emissions, and that there are no significant impacts on the surrounding environment. Monitoring would follow best practice guidance as defined by the IAQM (IAQM, 2018). The commitment is secured by the DCO.

Operational phase air quality monitoring

13.9.8 Monitoring of ambient air quality has been carried out by GAL since 1996 using automatic monitoring equipment. The airport has also funded local authority managed monitoring sites via a historic Section 106 (s.106) agreement.

13.9.9 A commitment is made to the continuation of monitoring of air quality at three permanent sites to be run jointly with the local authorities as well as LGW3 run by GAL. This monitoring will continue as it is as present through the construction phase and onwards. The funding agreement would be committed to until 2038 and would be reviewed every two years following.

13.9.10 Funding would be inclusive for revenue costs, including staff time, data management, servicing, and consumables as outlined in a schedule with associated indicative costs provided on or before 31 March each year.

13.9.11 Purchasing in accordance with a specification and programme set by RBBC and thereafter leasing to RBBC at nominal cost (say £1 per site per annum), such equipment (not covered under paragraph 13.9.10 and as agreed between the parties - such agreement not to be unreasonably withheld) as is needed to be replaced in order to maintain the current programme of air quality monitoring on three permanent sites.

13.9.12 GAL will arrange twice-yearly meetings with RBBC to discuss progress with air quality monitoring, the results thereof and any further initiatives that may be deemed appropriate.

13.9.13 The aims of the monitoring are to be able to identify and manage key sources of emissions on the airport site and assess their effects temporally using live data. The equipment would be co-located and adjusted following best practice monitoring methods.

13.9.14 New monitoring locations on the airport site and external to the airport are proposed, in order to allow for future monitoring of concentrations and allow for impacts of air quality reduction measures to be monitored.

13.9.15 A draft plan for the proposed locations is included in Figure 13.1.10. This shows the proposed transect of monitoring points, additional diffusion tube locations and an additional Monitoring Certification Scheme (MCERT) monitoring site that is proposed at the airport to allow detailed assessment of ambient air quality (including NO_2, PM_{10} and $PM_{2.5}$).

13.9.16 The key principles of the monitoring choices are to be able to monitor the key pollutants of concern (NO_2 and particulate matter and fine particulate matter (PM_{10} and $PM_{2.5}$)) using monitoring data to be able to identify peaks in concentrations and trace that back to either airport or non-airport activity. This is achieved by selecting a mixture of monitoring types including diffusion tubes, low cost automatic sensors (eg AQmesh type equipment) and MCERT automatic monitoring equipment.

13.9.17 The monitoring data collected would be made available via a publicly accessible website.

13.9.18 The on-site monitoring would be in place from opening (2028, one year prior to opening to gather a baseline) to 2038 to provide annual air quality monitoring results to the public and the local authorities. It will be reviewed every two years following.

13.9.19 In addition to monitoring key pollutants such as NO_2, PM_{10} and $PM_{2.5}$ GAL commits to participating in national aviation industry body studies of UFP emissions at airports including those reviewing how monitoring could be undertaken, as discussed in **ES Chapter 18: Health and Wellbeing** (Doc Ref.5.1).

13.10. Assessment of Effects

13.10.1 This section presents the results of the air quality assessment for each period, ie the initial construction period 2024-2029 and 2029-2032, first full year of opening 2029, interim assessment year 2032, design year 2038 and future year 2047. Each period presents the relevant emissions inventory, modelled concentrations, mitigation, monitoring and significance of effects.

Construction Periods: Airfield Construction (2024 – 2029) and Surface Access (2029 – 2032)

Emissions Inventory 2024: Airfield Construction

13.10.2 Table 13.10.1 presents a summary of the estimated annual NO_x, PM_{10} and $PM_{2.5}$ emissions for the future 2024 construction period assessment scenario for all sources across the study area. The 2024 construction period represents the construction airfield works which are to take place between 2024 and 2029. The 2024-2029 construction scenario for the airfield work has assumed the peak construction traffic flows applied to the first year of construction (2024) as a conservative assumption. The change in emissions is compared to the 2024 construction period without the Project in place, as shown in Table 13.7.3.

13.10.3 Emissions have been estimated to be 4,626 t/yr for NO_x, 294 t/yr for PM_{10} and 181 t/yr for $PM_{2.5}$ in the future 2024 construction period assessment scenario. Airport-related emissions have been estimated to be 2,138 t/yr for NO_x, 45 t/yr for PM_{10} and 31 t/yr for $PM_{2.5}$.

Table 13.10.1: Summary of Annual Pollutant Emissions for the 2024 construction scenario (With Project)

Source	Emissions With Project			Change in Emissions		
	NO_x (t/yr)	PM_{10} (t/yr)	$PM_{2.5}$ (t/yr)	NO_x (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	166.2	2.4	2.4	-	-	-
Hold	76.4	1.1	1.1	-	-	-
Take-off	422.8	1.4	1.4	-	-	-
Brake & tyre wear	N/A	6.6	3.3	-	-	-
APUs	71.1	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	26.2	0.2	0.2	-	-	-
CARE facility	N/A	N/A	N/A	-	-	-

Source	Emissions With Project			Change in Emissions		
	NO_x (t/yr)	PM_{10} (t/yr)	$PM_{2.5}$ (t/yr)	NO_x (t/yr)	PM_{10} (t/yr)	$PM_{2.5}$ (t/yr)
Car parks						
Car parks	2.7	0.3	0.2	-	-	-
Roads						
Airport	259.2	24.2	14.7	-0.3	0	0
Non-airport	2488.3	248.9	149.9	-1.6	1.0	0.6
Total (all sources)	**4,610**	**294**	**181**	**-1.9**	**1.0**	**0.6**
Total (airport-related)	**2,122**	**45**	**31**	**-0.3**	**0.0**	**0.0**

Emissions Inventory 2029: Surface Access Construction

13.10.4 Table 13.10.2 presents a summary of the estimated annual NO_x, PM_{10} and $PM_{2.5}$ emissions for the future 2029 construction period assessment scenario for all sources across the study area. The 2029 construction period represents the highways construction works including the improvements to surface access works, planned between 2029 and 2032. This 2029-2032 construction scenario has assumed the peak construction flows applied to the first year of this period (2029) as a conservative assumption. The change in emissions is compared to the 2029 construction period without the Project in place, as shown in Table 13.7.4.

13.10.5 Emissions have been estimated to be 3,591 t/yr for NO_x, 287 t/yr for PM_{10} and 172 t/yr for $PM_{2.5}$ in the future 2029 construction period assessment scenario. Airport-related emissions have been estimated to be 2,123 t/yr for NO_x, 45 t/yr for PM_{10} and 29 t/yr for $PM_{2.5}$.

Table 13.10.2: Summary of Annual Pollutant Emissions for the 2029 construction scenario (With Project)

Source	Emissions With Project			Change in Emissions		
	NO_x (t/yr)	PM_{10} (t/yr)	$PM_{2.5}$ (t/yr)	NO_x (t/yr)	PM_{10} (t/yr)	$PM_{2.5}$ (t/yr)
Aircraft in the air						
Approach	254.9	1.9	1.9	16.9	0.1	0.1
Initial climb	367.2	1.0	1.0	24.9	0.1	0.1
Climb out	521.1	1.8	1.8	36.8	0.1	0.1
Aircraft on the ground						
Landing	1.1	<0.1	<0.1	0.1	<0.1	<0.1
Reverse thrust	16.9	0.2	0.2	1.1	<0.1	<0.1
Taxiing	157.4	2.3	2.3	-8.8	-0.1	-0.1
Hold	54.1	0.8	0.8	-22.3	-0.3	-0.3
Take-off	454.7	1.5	1.5	31.9	0.1	0.1

Source	Emissions With Project			Change in Emissions		
	NO_x (t/yr)	PM_{10} (t/yr)	$PM_{2.5}$ (t/yr)	NO_x (t/yr)	PM_{10} (t/yr)	$PM_{2.5}$ (t/yr)
Brake & tyre wear	N/A	7.1	3.6	N/A	0.5	0.2
APUs	76.3	1.6	1.6	5.2	0.1	0.1
Engine testing	0.7	<0.1	<0.1	<0.1	<0.1	<0.1
Ground equipment						
GSE	13.7	2.2	1.1	-1.5	-0.2	-0.1
Fixed plant						
Fire training ground	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Energy plant	21.3	0.2	0.2	-4.9	<0.1	<0.1
CARE facility	15.7	0.1	0.1	N/A	N/A	N/A
Car parks						
Car parks	4.4	0.4	0.3	1.7	0.2	0.1
Roads						
Airport	163.5	24.2	14.6	4.4	0.6	0.4
Non-airport	1467.6	241.4	142.9	-1.4	-0.2	-0.1
Total (all sources)	**3,591**	**287**	**172**	**99.8**	**0.9**	**0.6**
Total (airport-related)	**2,123**	**45**	**29**	**101.2**	**1.1**	**0.7**

Construction Dust Assessment

13.10.6 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[4]. The assessment includes all construction activities related to the Project across the entire period of construction as outlined in the Project Description (**ES Chapter 5: Project Description** (Doc Ref. 5.1)). Separate construction dust assessments have been conducted for each element of the Project set out in Section 5.3 of **ES Chapter 5: Project Description** (Doc Ref. 5.1). 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 13.10.3 presents the Project elements and the associated dust generating activities from each element. The detailed assessment is presented in **ES Appendix 13.9.1: Air Quality Results Tables and Figures P2** (Doc Ref 5.3).

[4] 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*" (IAQM, 2014).

Table 13.10.3: 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	No	Yes	Yes	Yes
Reconfiguration of existing maintenance airfield facilities	Yes	Yes	Yes	Yes
Alterations to the Existing Northern Runway	Yes	Yes	Yes	Yes
Airfield works to support use of Altered Northern Runway	Yes	Yes	Yes	Yes
Pier 7	Yes	Yes	Yes	Yes
Extensions to North and South Terminals	Yes	Yes	Yes	Yes
Hotel and commercial facilities	Yes	Yes	Yes	Yes
Car parking	Yes	Yes	Yes	Yes
Surface access improvements	Yes	Yes	Yes	Yes
Reinstatement of final use at temporary construction compound locations	No	Yes	No	Yes
Flood compensation areas	Yes	Yes	Yes	Yes
Environmental mitigation	Yes	Yes	No	Yes
Access to construction compounds	No	No	No	Yes

13.10.7 Trackout associated with the construction periods has been assessed at areas where trackout could occur in relation to construction compounds and as HGVs exit the Project boundary and enter public roads or areas within 500m sensitive receptors as shown in **ES Appendix 13.9.1 Figure 2.1.2** (Doc Ref.5.3).

Sensitive Receptors

13.10.8 The assessment has identified sensitive receptors for the purpose of the construction dust assessment that are likely to experience a change in pollutant concentrations and/or dust nuisance due to the construction and operation of the Project. The construction dust methodology is outlined in Section 2 of **ES Appendix 13.4.1: Air Quality Assessment Methodology** (Doc Ref.5.3).

13.10.9 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 for example, hotels and places of work located around the North and South Terminals. There are also 'high sensitivity receptors' within 20 metres or 50 metres of some of the Project elements, for example the residential areas to the east of the airport including Horley Gardens Estate (**ES Appendix 13.6.2: Air Quality Receptors, in Figure 2.3.1 to Figure 2.3.3** (Doc Ref. 5.3)).

13.10.10 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

13.10.11 Following the IAQM guidance, the dust emission magnitude has been assigned for each dust-generating activity and for each Project element (IAQM, 2014). The majority of construction-related activities have a dust emission magnitude assigned to be large.

Sensitivity of the Area

13.10.12 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 (IAQM, 2014).

13.10.13 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 (IAQM, 2014). For the establishment of construction compounds and reinstatement of final use at the construction compounds, the sensitivity of the area to dust soiling has been assigned as medium due to the presence of between 1 and 10 high sensitivity receptors within 20 metres of the element boundaries.

13.10.14 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 (IAQM, 2014).

13.10.15 The annual average PM_{10} concentration estimated by Defra for the grid squares associated with the Project 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

13.10.16 Taking into consideration the dust emission magnitude and the sensitivity of the area, the dust soiling risks for all Project elements were determined for the construction periods (Table 13.10.4). The risk of dust soiling impacts from the Project elements for trackout is medium with a range from negligible to high for demolition, earthworks and construction. The risk of human health impacts ranges from negligible to medium for demolition and is low for earthworks, construction and trackout.

13.10.17 Further details of the results of the construction dust assessment for each of the Project elements are presented in **ES Appendix 13.9.1: Air Quality Results Tables and Figures – P2** (Doc Ref.5.3). Best practice mitigation measures to minimise the risk of dust soiling and human health impacts are provided in **ES Appendix 13.8.1: Construction Period Mitigation** (Doc Ref.5.3).

Table 13.10.4: Risk of Impacts for Dust Soiling and Human Health in the Absence of Embedded Mitigation

Impact	Construction-related Activity			
	Demolition	Earthworks	Construction	Trackout
Dust soiling	Negligible to High	Low to High	Low to High	Medium
Human health	Negligible to Medium	Low	Low	Low

13.10.18 Following the implementation of appropriate embedded mitigation as set out in **ES Appendix 13.8.1: Construction Period Mitigation** (Doc Ref.5.3), but without any additional actions being required, the effects of construction-related activities on dust soiling and human health would be negligible and the effects would therefore not be significant.

13.10.19 Construction activities will continue between 2024 and 2032. The assessment carried out is representative of the worst case during all years and mitigation will apply from the start of construction works to the end of all construction related activity.

Construction Traffic Assessment (Construction Period for Airfield)

Human Receptors

13.10.20 The modelled results for human receptors in 2024 are presented in **ES Appendix 13.9.1: Air Quality Results Tables and Figures P2** (Doc Ref.5.3) with all modelled human receptors shown in **ES Appendix 13.6.2: Air Quality Receptors (Figure 2.1.1 to Figure 2.1.5)** (Doc Ref.5.3).

13.10.21 There are 57 receptors modelled in the Hazelwick AQMA. The highest annual mean NO_2 concentration is predicted to be 31.8 µg/m^3 at receptor R_538, located on Tinsley Lane, Crawley between the two arms of the roundabouts Gatwick Road and Crawley Avenue (A2011). An increase of less than 0.1 µg/m^3 is predicted at this location. The largest change in NO_2 concentrations due to the works in 2024 is predicted to be 0.1 µg/m^3 increase, for example at receptor R_525, located on A2011 Crawley Avenue which has the largest With Project total of 27.5 µg/m^3.

13.10.22 There are 112 receptors modelled in the Horley AQMA. The highest annual mean NO_2 concentration is predicted to be 31.3 µg/m^3 at receptor R_616, Brighton Road, Horley. NO_2 concentrations are predicted to decrease at this location by 0.1 µg/m^3. The largest change in NO_2 concentrations due to the construction period in 2024 is predicted to be 0.3 µg/m^3, for example at receptor R_600 on Longbridge Road which has the largest With Project total of 23.8 µg/m^3.

13.10.23 NO_2 concentrations at all receptors in the two AQMAs are predicted to be below the air quality standard in the construction period, therefore this construction period would not create exceedances of the air quality standards in these areas.

13.10.24 In the rest of the study area, there are ten predicted exceedances of the air quality standard in annual mean NO_2 concentrations. The maximum concentration is 52.1 µg/m^3 at R_48, Common Lane, close to the M25. However, the future baseline concentrations without the Project at this location also exceed the air quality standard. The 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.

13.10.25 The largest change in NO_2 concentrations due to the Project construction period in 2024 is predicted to be 0.5 µg/m^3 increase at receptor R_147 at Sutton Common Road located in Sutton (the predicted concentration with the construction works is predicted to be 26.7 µg/m^3). This is well below the air quality standard (40 µg/m^3).

13.10.26 All receptors are predicted to experience negligible impacts. Therefore, no significant effects are predicted for NO_2 concentrations due to the construction works in 2024.

13.10.27 There are no predicted exceedances of the PM_{10} objective in the do minimum or do something scenarios. The highest annual mean PM_{10} concentration is predicted to be 23.1 µg/m^3 at receptor R_48 on Common Lane, close to the M25. The largest change in annual mean PM_{10} concentrations due to the construction of the Project in 2024 is predicted to be 0.4 µg/m^3 at receptor R_147 at Sutton Common Road which has a With Project total of 17.8 µg/m^3. Overall, negligible impacts are predicted at all human receptors due to construction works in 2024 for PM_{10} concentrations and therefore no significant effects are anticipated.

13.10.28 There are predicted exceedances of the $PM_{2.5}$ objective in the do minimum and do something scenario. The highest annual mean $PM_{2.5}$ concentration is predicted to be 15.2 µg/m^3 at receptor R_48 on Common Lane, near the M25. The largest change in annual $PM_{2.5}$ concentrations due to the construction of the Project in 2024 is predicted to be 0.2 µg/m^3 at R_147 Sutton Common Road and P_178 A23 (London Road) which has a With Project total of 12.1 µg/m^3. Negligible impacts are predicted at the majority of human receptors due to construction works in 2024 for $PM_{2.5}$ concentrations. The modelled changes have identified two locations of moderate adverse impact (R_117 and R_147) and two slight adverse impacts (H_166 and H_280) located in Croydon and Sutton. A review of traffic changes in those areas indicates the project is unlikely to change traffic in those areas and the changes are attributed to modelled traffic noise as detailed in Annex E of **ES Chapter 12: Traffic and Transport** (Doc Ref. 5.1). As the changes are not representative of changes due to the Project, they are not considered significant and therefore overall, no significant effects are anticipated.

13.10.29 As described in Section 13.5, human receptors have been assessed in accordance with the EPUK/IAQM guidance (IAQM and EPUK, 2017) to determine impact descriptors and whether effects are likely to be significant. The impacts were determined using Table 13.5.3 and as an example, the negligible impacts predicted in 2024 for NO_2 at all receptors equate to a concentration change less than 1% or 5% of the air quality standard where a long-term concentration is less than 95% or 75% of the air quality standard, respectively. Impacts that are negligible are not considered significant and therefore no significant effects are predicted for NO_2 or PM_{10} concentrations due to the construction works in 2024. Full results tables with modelled concentrations, impact descriptors and significance are presented in **ES Appendix 13.9.1: Air Quality Results Tables and Figures – P2** (Doc Ref.5.3).

Compliance Receptors

13.10.30 The modelled compliance receptors in 2024 are presented in **ES Appendix 13.9.1: Air Quality Results Tables and Figures – P2** (Doc Ref.5.3) with all modelled receptors shown in **ES Appendix 13.6.2: Air Quality Receptors** (Figure 2.2.1 to Figure 2.2.2) (Doc Ref.5.3). The results show that the Project is not predicted to impact compliance with the air quality standards.

Ecological Receptors

13.10.31 Pollutant concentrations for annual mean NO_x and NH_3 are predicted at 316 sensitive ecological receptors for the 2024 construction scenario.

Annual-mean NO_x concentrations

13.10.32 Predicted annual mean NO_x concentrations have been compared against the critical level of 30µg/m^3. Where the total predicted with scheme concentrations are below the critical level, then no significant effects would be anticipated at a site in relation to NO_x concentrations.

13.10.33 In the 2024 construction scenario, 139 receptors are predicted to experience concentrations above the critical level annual mean standard of NO_x of 30 µg/m^3. These concentrations occur in both the 'with' and 'without' Project scenarios. The results have been considered in **ES Chapter 9: Ecology and Nature Conservation** (Doc Ref.5.1) to determine significance

Nitrogen deposition

13.10.34 An assessment of nitrogen deposition has been undertaken for comparison against the relevant critical load for each site. Where the change in nitrogen deposition is less than 1% of the site's lower critical load, then no significant effects would be anticipated. The assessment of nitrogen deposition includes contributions from both NO_x and NH_3 emissions.

13.10.35 As a result of the Project, a change of 1% of the lower critical load criterion is predicted at 26 sites in the 2024 construction scenario.

13.10.36 As the changes are greater than 1% of the critical level/ lower critical load, the assessment of effects has been considered in **ES Chapter 9: Ecology and Nature Conservation** (Doc Ref. 5.1) to determine significance. All other sites have a change of less than 1% compared to the critical level/ lower critical load and are therefore considered to be insignificant.

Acid Deposition

13.10.37 An assessment of acid deposition has been undertaken in terms of the Critical Load Functions for acidity for HRA sites in the main assessment (Thames Basin Heaths, Mole Gap to Reigate Escarpment (MGRE) and Thursley, Ash, Pirbright and Chobham (TAPC)). Acidity includes nitrogen and sulphur contributions. There are no sulphur emissions from road vehicles, aircraft engines and other airport sources that would significantly affect the acidity at the ecological sites. Therefore, the acid deposition assessment has focussed on the nitrogen components (ie NO_2 and NH_3).

13.10.38 The change in acid deposition is predicted to be below 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.

13.10.39 The modelled results for ecological receptors are presented in **ES Appendix 13.9.1: Air Quality Results Tables and Figures P2** (Doc Ref.5.3).

Further Mitigation

13.10.40 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, beyond that in provided in **ES Appendix 13.8.1: Construction Period Mitigation** (Doc Ref.5.3), is proposed.

Future Monitoring

13.10.41 Since no significant effects have been predicted for air quality during construction, no further additional monitoring (beyond that required for high-risk construction sites and set out in **ES Appendix 13.8.1: Construction Period Mitigation** (Doc Ref.5.3) is required. Monitoring commitments are intended to be secured under the Section 106 Agreement to be entered in relation to the Project.

Significance of Effects

13.10.42 No further mitigation or monitoring is required and therefore the effects would remain not significant for air quality.

Construction Traffic Assessment (Construction Period for Surface Access Improvements)

Human Receptors

13.10.43 The modelled results for human receptors in 2029 are presented in **ES Appendix 13.9.1: Air Quality Results Tables and Figures P2** (Doc Ref.5.3) with all modelled human receptors shown in **ES Appendix 13.6.2: Air Quality Receptors** (Figure 2.1.1 to Figure 2.1.5) (Doc Ref.5.3).

13.10.44 There are 57 receptors modelled in the Hazelwick AQMA. The highest annual mean NO_2 concentration is predicted to be 25.3 µg/m^3 at receptor R_538, located on Tinsley Lane, Crawley between the two arms of the roundabouts Gatwick Road and Crawley Avenue (A2011). An increase of 0.2 µg/m^3 is predicted at this location. The largest change in NO_2 concentrations due to the works in 2029 is predicted to be 0.3 µg/m^3 increase in the AQMA at receptor R_388, located on the north-eastern arm of the AQMA on Capua Court which has a With Project total of 19.0 µg/m^3.

13.10.45 There are 112 receptors modelled in the Horley AQMA. The highest annual mean NO_2 concentration is predicted to be 26.4 µg/m^3 at receptor R_480, located on Greenings, The Crescent, Horley. NO_2 concentrations are predicted to decrease at this location by 0.8 µg/m^3. The largest change in NO_2 concentrations due to the construction period in 2029 is predicted to be 0.2 µg/m^3 at receptor R_595 on Woodroyd Gardens, Horley which has a With Project total of 21.4 µg/m^3.

13.10.46 NO_2 concentrations at all receptors in the two AQMAs are predicted to be below the air quality standard in the construction period, therefore this construction period would not create exceedances of the air quality standards in these areas.

13.10.47 In the rest of the study area, there is one predicted exceedance (40.7 µg/m^3 at receptor R_48 on Common Lane, close to the M25) of the air quality standard in annual mean NO_2 concentrations. However, the future baseline concentrations without the Project at this location also exceed the air quality standard. The change at the receptor that exceeds the air quality standard with and without the Project is <0.1 µg/m^3.

13.10.48 The largest change in NO_2 concentrations due to the Project construction period in 2029 is predicted to be 2.0 µg/m^3 increase at receptor R103 at Hassocks Gate (the predicted concentration with the construction works is predicted to be 18.3 µg/m^3). This is well below the air quality standard (40 µg/m^3).

13.10.49 Overall, there is one slight beneficial impact predicted at human receptor H_113 (Gatwick Ambulance Station) as a result of an improvement of 2 µg/m^3 in annual mean NO_2 concentrations. All other receptors are predicted to experience negligible impacts. Therefore, no significant effects are predicted for NO_2 concentrations due to the construction works in 2029. The beneficial impacts are due to a decrease in concentrations from airport sources. These include aspects such as shorter taxiing times, moving some aircraft departures to the northern runway, different fleet mix and transition to electrification for the with Project scenario.

13.10.50 No exceedances are predicted for annual mean PM_{10} concentrations. The highest annual mean PM_{10} concentration is predicted to be 22.8 µg/m^3 at receptor R_48 on Common Lane, close to the M25. The largest change in annual mean PM_{10} concentrations is predicted to be 0.4 µg/m^3 at receptor R_147 Sutton Common Road which has a With Project total of 17.6 µg/m^3. Overall, negligible impacts are predicted at all human receptors due to construction works in 2029 for PM_{10} concentrations and therefore no significant effects are anticipated.

13.10.51 There are predicted exceedances of the $PM_{2.5}$ objective in the do minimum and do something scenario. The highest annual mean $PM_{2.5}$ concentration is predicted to be 15.0 µg/m^3 at receptor R_48 on Common Lane, close to the M25. 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 receptor R_147 Sutton Common Road which has a With Project total of 11.9 µg/m^3. Negligible impacts are predicted at the majority of human receptors due to construction works in 2029 for $PM_{2.5}$ concentrations. The modelled changes have identified one location of moderate adverse impact (R_147) and three slight adverse impacts (R_117, H_166 and H_280) located in Croydon and Sutton. A review of traffic changes in those areas indicates the project is unlikely to change traffic in those areas and the changes are attributed to modelled traffic noise as detailed in Annex E of **ES Chapter 12: Traffic and Transport** (Doc Ref. 5.1). As the changes are not representative of changes due to the Project they are not considered significant and therefore overall no significant effects are anticipated.

13.10.52 As described in Section 13.5, human receptors have been assessed in accordance with the EPUK/IAQM guidance (IAQM and EPUK, 2017) to determine impact descriptors and whether effects are likely to be significant. The impacts were determined using Table 13.5.3 and as an example, the negligible impacts predicted in 2029 for all but one receptor equate to a concentration change less than 1% or 5% of the air quality standard where a long term concentration is less than 95% or 75% of the air quality standard, respectively. The slight beneficial impact where a change of 2µg/m^3 is predicted is determined as a change of 5% and a total less than 95% of the air quality standard. Impacts that are negligible or slight are not considered significant and therefore no significant effects are predicted for NO_2 or PM_{10} concentrations due to the construction works in 2029. Full results tables with modelled concentrations, impact descriptors and significance are presented in **ES Appendix 13.9.1: Air Quality Results Tables and Figures P2** (Doc Ref.5.3). The impact criteria is presented in this section for the first year of operation and the methodology of assessing impact is constant within each future year.

Compliance Receptors

13.10.53 The modelled compliance receptors in 2029 are presented in **ES Appendix 13.9.1: Air Quality Results Tables and Figures P2** (Doc Ref.5.3) with all modelled receptors shown in **ES Appendix 13.6.2: Air Quality Receptors** (Figure 2.2.1 to Figure 2.2.2) (Doc Ref.5.3).

13.10.54 The NO_2 and PM_{10} results show that the Project is not predicted to impact compliance with the air quality standards.

13.10.55 For $PM_{2.5}$ there is one location P_92, 93 (A235 London Road) in Croydon where the interim target of 12µg/m^3 is exceeded and a change of 0.1µg/m^3 is predicted. As noted for the human receptor results a review of traffic changes in those areas indicates the Project is unlikely to change traffic in those areas and the changes are attributed to modelled traffic noise as detailed in Annex E of **ES Chapter 12: Traffic and Transport** (Doc Ref. 5.1). A review of traffic changes in these areas indicates that airport traffic represents a very small proportion of traffic (less than 1%), therefore it is not considered that the Project will impact on compliance with the air quality standards.

Ecological Receptors

13.10.56 Pollutant concentrations for annual mean NO_x and NH_3 are predicted at 316 sensitive ecological receptors for the 2029 construction scenario.

Annual-mean NO_x concentrations

13.10.57 Predicted annual mean NO_x concentrations have been compared against the critical level of 30µg/m^3. Where the total predicted with scheme concentrations are below the critical level, then no significant effects would be anticipated at a site in relation to NO_x concentrations.

13.10.58 In the 2029 construction scenario, 79 receptors are predicted to experience concentrations above the critical level. These concentrations occur in both the 'with' and 'without' Project scenarios. The results have been considered in **ES Chapter 9: Ecology and Nature Conservation** (Doc Ref. 5.1) to determine significance.

Nitrogen deposition

13.10.59 An assessment of nitrogen deposition has been undertaken for comparison against the relevant critical load for each site. Where the change in nitrogen deposition is less than 1% of the site's lower critical load, then no significant effects would be anticipated. The assessment of nitrogen deposition includes contributions from both NO_x and NH_3 emissions.

13.10.60 As a result of the Project, the 1% of the lower critical load criterion is exceeded at 30 sites in the 2029 construction scenario.

13.10.61 As the changes are greater than 1% of the critical level/ lower critical load, the assessment of effects has been considered in **ES Chapter 9: Ecology and Nature Conservation** (Doc Ref. 5.1) to determine significance. All other sites have a change of less than 1% compared to the critical level/ lower critical load and are therefore considered to be insignificant.

Acid Deposition

13.10.62 The change in acid deposition is predicted to be a maximum of 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.

13.10.63 The modelled results for ecological receptors are presented in **ES Appendix 13.9.1: Air Quality Results Tables and Figures P2** (Doc Ref. 5.3)**.**

Further Mitigation

13.10.64 No significant effects for air quality are anticipated for the first year of construction of airfield works (2029) as a result of the Project and therefore no further mitigation, beyond that in provided in **ES Appendix 13.8.1: Construction Period Mitigation** (Doc Ref. 5.3), is proposed.

Future Monitoring

13.10.65 Since no significant effects have been predicted for air quality during construction, no further additional monitoring (beyond that required for high-risk construction sites and provided in **ES Appendix 13.8.1: Construction Period Mitigation** (Doc Ref. 5.3) is required. Monitoring commitments are intended to be secured under the Section 106 Agreement to be entered in relation to the Project.

Significance of Effects

13.10.66 No further mitigation or monitoring is required and therefore the effects would remain not significant for air quality.

Operational Periods: 2029, 2032, 2038, 2047

Opening Year 2029

Emissions Inventory

13.10.67 Table 13.10.5 presents a summary of the estimated annual NO_x, PM_{10} and $PM_{2.5}$ emissions for the future 2029 assessment scenario for all sources across the study area. The change in emissions is compared to the 2029 future baseline without the Project in place, shown in Table 13.7.5.

13.10.68 Emissions have been estimated to be 3,623 t/yr for NO_x, 287 t/yr for PM_{10} and 174 t/yr for $PM_{2.5}$ in the first full year of opening (2029) scenario. Airport-related emissions have been estimated to be 2,124 t/yr for NO_x, 45 t/yr for PM_{10} and 31 t/yr for $PM_{2.5}$.

13.10.69 When compared to the 2029 future baseline scenario, ie without the Project (Table 13.7.5), it can be observed that the Project would result in an overall increase in emissions for all of the sources combined however there is a reduction in emissions for some aspects of the Project. The overall increase is due to increases in aircraft movements and associated activities on the airport, as well as increases in road traffic. NO_x emissions from aircraft are predicted to increase by 78.6 t/yr for aircraft in the air and 7.2 t/yr for aircraft on the ground. NO_x emissions from airport-related road traffic are predicted to increase by 4.5 t/yr due to the Project in 2029.

13.10.70 For airport-related PM_{10} and $PM_{2.5}$, the emissions are predicted to increase by 2.2 t/yr for PM_{10} and 0.6 t/yr for $PM_{2.5}$ for the first full year of opening in 2029 compared to the 2029 future baseline.

Table 13.10.5: Summary of Annual Pollutant Emissions for the First Full Year of Opening in 2029 (With Project)

Source	Emissions With Project			Change in Emissions		
	NO_x (t/yr)	PM_{10} (t/yr)	$PM_{2.5}$ (t/yr)	NO_x (t/yr)	PM_{10} (t/yr)	$PM_{2.5}$ (t/yr)
Aircraft in the air						
Approach	254.9	1.9	1.9	16.9	0.1	0.1
Initial climb	367.2	1.0	1.0	24.9	0.1	0.1
Climb out	521.1	1.8	1.8	36.8	0.1	0.1
Aircraft on the ground						
Landing	1.1	<0.1	<0.1	0.1	<0.1	<0.1
Reverse thrust	16.9	0.2	0.2	1.1	<0.1	<0.1
Taxiing	157.4	2.3	2.3	-8.8	-0.1	-0.1
Hold	54.1	0.8	0.8	-22.3	-0.3	-0.3
Take-off	454.7	1.5	1.5	31.9	0.1	0.1
Brake & tyre wear	N/A	7.1	3.6	N/A	0.5	0.2
APUs	76.3	1.6	1.6	5.2	0.1	0.1
Engine testing	0.7	<0.1	<0.1	<0.1	<0.1	<0.1
Ground equipment						
GSE	13.7	2.2	1.1	-1.5	-0.2	-0.1
Fixed plant						
Fire training ground	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Energy plant	21.3	0.2	0.2	-4.9	<0.1	<0.1
CARE facility	15.7	0.1	0.1	N/A	N/A	N/A
Car parks						
Car parks	4.4	0.4	0.3	1.7	0.2	0.1
Roads						
Airport	164.5	24.1	14.5	2.8	1.8	0.3
Non-airport	1498.6	241.9	143.3	-1.2	-0.2	-0.1
Total (all sources)	**3,623**	**287**	**174**	**98.4**	**2.1**	**0.5**
Total (airport-related)	**2,124**	**45**	**31**	**99.6**	**2.3**	**0.6**

Modelled Concentrations

CARE Facility

13.10.71 The CARE facility has been assessed using detailed dispersion modelling as set out in **ES Appendix 13.4.1: Air Quality Assessment Methodology** (Doc Ref. 5.3). The results are presented in this section for the first year of operation. The results are not presented again for future years as the impact is assessed as being constant within each year. The total emissions have been taken into account in the total concentrations in all future years.

13.10.72 The CARE facility results in no significant impacts as a result of the Project. The maximum concentration of SO_2, CO and VOCs (Benzene) remain well below the relevant objectives as defined in Table 13.2.2 and all changes are determined to be not significant based on the EPUK/IAQM criteria (IAQM and EPUK, 2017).

Plume Visibility Assessment

13.10.73 It is predicted that from the CARE facility there would be no visible plumes greater than 20m in length during any part of the year. To assess potential inter-year variability, five years of meteorological data (2014-2018) were considered and assessed. The conclusion remained unchanged between years, which is considered likely due to the relatively low moisture content of the exhaust gases (based on ESG 2017 monitoring data).

13.10.74 In the 2018 meteorological year, five visible plume hours were predicted across the whole year. For all other assessed years (2014-2017), no visible plume hours were predicted.

13.10.75 There is no guidance available from an air quality perspective for the assessment of significance of a visible plume. Significance of the plume is an aspect that has been considered in **ES Chapter 8: Landscape, Townscape and Visual Resources** (Doc Ref. 5.1).

Human Receptors

13.10.76 The modelled results for human receptors for the first year of opening (2029) are presented in ES **Appendix 13.9.1: Air Quality Results Tables and Figures P4** (Doc Ref.5.3). All modelled human receptors are shown in ES **Appendix 13.6.2: Air Quality Receptors** (Figure 2.1.1 to Figure 2.1.5) (Doc Ref.5.3).

13.10.77 There are 57 receptors modelled in the Hazelwick AQMA. The highest annual mean NO_2 concentration is predicted to be 24.2 µg/m^3 at receptor R_562, located at Woodfield Road at the corner of the junction with Northgate Avenue (A2004) is one of the arms of the Hazelwick roundabout. An increase of less than 0.1 µg/m^3 is predicted at this location. 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 increase, for example at receptor R_553 located at North Road Three Bridges which has the largest With Project total of 23.9 µg/m^3.

13.10.78 There are 112 receptors modelled in the Horley AQMA. The highest annual mean NO_2 concentration is predicted to be 25.9 µg/m^3 at receptor R_480 located on Greenings, The Crescent, Horley. NO_2 concentrations are predicted to decrease at this location by 0.9 µg/m^3. 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, for example at receptor R_595 located at Vernon Woodroyd Gardens Horley which has the largest With Project total of 20.8 µg/m^3.

13.10.79 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.

13.10.80 In the rest of the study area, no exceedances are predicted for annual mean NO_2 concentrations. The highest annual mean NO_2 concentration is predicted to be 37.6 µg/m^3 at receptor R_48 on Common Lane, close to the M25 with and without the Project in 2029. The largest change in NO_2 concentrations due to the Project in 2029 is predicted to be 0.6 µg/m^3 at receptors R_177 (Povey Cross Road), R_178, R_179 and R_180 (Charlwood Road), EHO_1 (St Michaels, Charlwood Rd), EHO_2 (Povey Cross Rd) and EHO_70 (Horley Road). The maximum predicted concentration at these receptors with the Project is 17.4 µg/m^3 at R_180. 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.

13.10.81 Overall, there is one slight beneficial impact predicted at human receptor H_113 (Gatwick Ambulance Station) in 2029 due to the Project for NO_2 concentrations as a result of an improvement in 0.9 µg/m^3. All other receptors are predicted to experience negligible impacts. Therefore, no significant effects are predicted for NO_2 concentrations due to the Project in 2029. The beneficial impact is due to a decrease in concentrations from airport sources. These include aspects such as shorter taxiing times, moving some aircraft departures to the northern runway, different fleet mix and higher electricity use for the Project scenario.

13.10.82 There are no predicted exceedances of the PM_{10} objective in the do minimum or do something scenarios. The highest annual mean PM_{10} concentration is predicted to be 21.6 µg/m^3 at receptors R_48 on Common Lane, close to the M25. 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 in 2029 is predicted to be 0.1 µg/m^3 at 26 receptors. 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}.

13.10.83 There are predicted exceedances of the $PM_{2.5}$ objective in the do minimum and do something scenario. The highest annual mean $PM_{2.5}$ concentration is predicted to be 14.2 µg/m^3 at receptor R_48 on Common Lane, close to the M25. 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, for example at receptor R_411 located at Ashcombe Road which has the largest With Project total of 13.0 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.

13.10.84 The contours (Figure 13.1.1 to 13.1.9) show that no locations on-site where receptors relevant to the short-term objective as defined in Table 13.2.2 are located exceed a concentration of 60µg/m^3. Therefore, following LAQM (TG22) (Defra, 2022) guidance the impact is considered to be not significant. This is the same for all future scenarios and is therefore not repeated for the future years in the sections below.

Compliance Receptors

13.10.85 The modelled compliance receptors in 2029 are presented in **ES Appendix 13.9.1: Air Quality Results Tables and Figures P2** (Doc Ref.5.3) with all modelled receptors shown in **ES Appendix 13.6.2: Air Quality Receptors** (Figure 2.2.1 to Figure 2.2.2) (Doc Ref. 5.3).

13.10.86 The NO_2 and PM_{10} results show that the Project is not predicted to impact compliance with the air quality standards.

13.10.87 For $PM_{2.5}$ there is one location P_109, 110 (A212 Wellesley Road) in Croydon where the interim target of 12µg/m^3 is exceeded and a change of 0.1µg/m^3 is predicted. As noted for the human receptor results a review of traffic changes in those areas indicates the project is unlikely to change traffic in those areas and the changes are attributed to modelled traffic noise as detailed in Annex E of **ES Chapter 12: Traffic and Transport** (Doc Ref. 5.1). As the changes are not representative of changes due to the Project there is no predicted to impact to compliance with the air quality standards.

Ecological Receptors

13.10.88 Pollutant concentrations for annual mean NO_x and NH_3 are predicted at 316 sensitive ecological receptors for 2029.

Annual-mean NO_x concentrations

13.10.89 In the 2029 operational scenario, 67 receptors are predicted to experience concentrations above the critical level annual mean standard for NO_x of 30 µg/m^3. These concentrations occur in both the 'with' and 'without' Project scenarios. No receptors in 2029 are predicted to result in a change of more than 1% of the critical level.

Nitrogen Deposition

13.10.90 As a result of the Project, the above 1% of the lower critical load criterion for nitrogen deposition is exceeded at 4 sites in the 2029 operational scenario.

13.10.91 As the changes are greater than 1% of the critical level/ lower critical load, the assessment of effects has been considered in **ES Chapter 9: Ecology and Nature Conservation** (Doc Ref. 5.1) to determine significance. All other sites have a change of less than 1% compared to the critical level/ lower critical load and are therefore considered to be not significant.

Acid Deposition

13.10.92 The change in acid deposition is predicted to be below 0.1 keq/ha/yr. The change in acid deposition falls within the critical load function for the site and therefore no significant acidity effects are anticipated.

13.10.93 The modelled results for ecological receptors for the first year of opening (2029) are presented in **ES Appendix 13.9.1: Air Quality Results Tables and Figures P4** (Doc Ref.5.3).

Slow Fleet Transition Case

13.10.94 There are no changes to the magnitude of impact for all pollutants (NO_2, PM_{10} and $PM_{2.5}$) predicted in the slow fleet transition scenario for 2029. A change in aviation emissions in the SFT case does not have a large impact on predicted concentrations compared to the main assessment scenarios due to the distance from receptors.

Further Mitigation

13.10.95 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 is proposed.

Future Monitoring

13.10.96 Since no significant effects have been predicted for air quality in 2029, no additional monitoring beyond that included in the Project is proposed. Monitoring commitments are intended to be secured under the Section 106 Agreement to be entered in relation to the Project.

Significance of Effects

13.10.97 No further mitigation or monitoring is required and therefore the effects would remain as not significant.

Interim Assessment Year: 2032

Emissions Inventory

13.10.98 Table 13.10.6 presents a summary of the estimated annual NO_x, PM_{10} and $PM_{2.5}$ emissions for the future 2032 assessment scenario for all sources across the study area. The change in emissions is compared to the 2032 future baseline without the Project in place, shown in Table 13.7.6.

13.10.99 Emissions have been estimated to be 3,719 t/yr for NO_x, 298 t/yr for PM_{10} and 180 t/yr for $PM_{2.5}$ in the interim assessment year of 2032. Airport-related emissions have been estimated to be 2,348 t/yr for NO_x, 50 t/yr for PM_{10} and 34 t/yr for $PM_{2.5}$.

13.10.100 When compared to the 2032 future baseline scenario, ie without the Project (Table 13.7.6), it can be observed that the Project would result in an overall increase in NO_x emissions and increase for PM_{10} and $PM_{2.5}$ emissions. This is due to increases in aircraft movements and associated activities on the airport, as well as increases in road traffic.

13.10.101 For airport-related PM_{10} and $PM_{2.5}$, the emissions are predicted to increase by 8 t/yr for PM_{10} and 4 t/yr for $PM_{2.5}$ in total.

Table 13.10.6: Summary of Annual Pollutant Emissions for the Interim Assessment Year of 2032 (With Project)

Source	Emissions With Project			Change in Emissions		
	NO_x (t/yr)	PM_{10} (t/yr)	$PM_{2.5}$ (t/yr)	NO_x (t/yr)	PM_{10} (t/yr)	$PM_{2.5}$ (t/yr)
Aircraft in the air						
Approach	281.4	1.9	1.9	49.3	0.3	0.3
Initial climb	419.8	1.0	1.0	71.4	0.2	0.2
Climb out	551.3	1.7	1.7	96.3	0.3	0.3
Aircraft on the ground						
Landing	1.1	<0.1 <0.1	0.2	<0.1	<0.1	
Reverse thrust	18.1	0.2 0.2	3.0	<0.1	<0.1	
Taxiing	188.5	2.4	2.4	22.7	0.2	0.2
Hold	85.5	1.1	1.1	9.8	0.1	0.1
Take-off	496.1	1.4	1.4	86.9	0.2	0.2

Source	Emissions With Project			Change in Emissions		
	NO_x (t/yr)	PM_{10} (t/yr)	$PM_{2.5}$ (t/yr)	NO_x (t/yr)	PM_{10} (t/yr)	$PM_{2.5}$ (t/yr)
Brake & tyre wear	N/A	8.3	4.2	N/A	1.5	0.8
APUs	82.4	1.8	1.8	15.1	0.3	0.3
Engine testing	0.8	<0.1 <0.1	0.1	<0.1	<0.1	
Ground equipment						
GSE	13.2	2.2	1.1	-0.7	-0.1	-0.1
Fixed plant						
Fire training ground	0.1	<0.1 <0.1	<0.1	<0.1	<0.1	
Energy plant	20.9	0.2 0.2	-5.6	<0.1	<0.1	
CARE facility	15.7	0.1	0.1	N/A	N/A	N/A
Car parks						
Car parks	4.5	0.5	0.4	1.9	0.2	0.2
Roads						
Airport	168.3	28.0	16.8	22.2	3.9	2.3
Non-airport	1370.9	247.2	146.2	-7.3	-1.0	-0.6
Total (all sources)	**3,719**	**298**	**180**	**381.2**	**6.3**	**4.4**
Total (airport-related)	**2,348**	**50**	**34**	**388.5**	**7.3**	**5.0**

Modelled Concentrations

Human Receptors

13.10.102 The modelled results for human receptors for the interim assessment year (2032) are presented in **ES Appendix 13.9.1: Air Quality Results Tables and Figures P5** (Doc Ref. 5.3). All modelled human receptors are shown in **ES Appendix 13.6.2: Air Quality Receptors** (Figure 2.1.1 to Figure 2.1.5) (Doc Ref.5.3).

13.10.103 There are 57 receptors modelled in the Hazelwick AQMA. The highest annual mean NO_2 concentration within this AQMA is predicted to be 24.0 µg/m^3 at receptor R_562 at Woodfield Road at the corner of the junction with Northgate Avenue (A2004) is one of the arms of the Hazelwick roundabout. An increase of 0.1 µg/m^3 is predicted at this location. The largest change in NO_2 concentrations, in the AQMA, due to the Project in 2032 is predicted to be 0.3 µg/m^3 at receptor R_538 Tinsley Lane, Crawley which has a With Project total of 24.0 µg/m^3.

13.10.104 There are 112 receptors modelled in the Horley AQMA. The highest annual mean NO_2 concentration within this AQMA is predicted to be 26.8 µg/m^3 at receptor R_480 (Greenings, The Crescent, Horley) and an increase of 0.6 µg/m^3 is predicted at this location. The largest change in

NO_2 concentrations due to the Project in 2032 is predicted to be 1.5 µg/m^3 at receptor R_570 at Riverside in Horley, which has a With Project total of 21.1 µg/m^3.

13.10.105 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.

13.10.106 In the rest of the study area, no exceedances are predicted for annual mean NO_2 concentrations. The highest annual mean NO_2 concentration is predicted to be 36.2 µg/m^3 at receptor R_48, located at Common Lane, close to the M25. 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 1.3 µg/m^3 at receptors R_177 (Povey Cross Road) and EHO_2 (Povey Cross Rd), increasing to 17.8 µg/m^3 and 17.7 µg/m^3 respectively. There is one slight adverse impact predicted at receptor H_113 at Gatwick Ambulance Station due to an increase in aircraft sources. The predicted concentration at this location is 31.8 µg/m^3 with the Project. There are negligible impacts predicted at all other human receptors. Therefore, in 2032 due to the Project there are no significant effects anticipated for NO_2 concentrations.

13.10.107 There are no predicted exceedances of the PM_{10} objective in the do minimum or do something scenarios. The highest annual mean PM_{10} concentration is predicted to be 21.7 µg/m^3 at receptors R_48 at Common Lane. 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 0.4 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}.

13.10.108 There are predicted exceedances of the $PM_{2.5}$ objective in the do minimum and do something scenario. The highest annual mean $PM_{2.5}$ concentration due to the Project is predicted to be 14.3 µg/m^3 at receptor R_48 at Common Lane, close to the M25. The largest change in annual $PM_{2.5}$ concentrations due to the Project in 2032 is predicted to be 0.2 µg/m^3, for example at receptor CD_77 located close to the M25 which has the largest With Project total of 10.4 µg/m^3. There is one slight adverse impact predicted at receptor EHO_75 adjacent to M23 Airport Way. There are negligible impacts predicted at all other receptors. Therefore in 2032 due to the Project there are no significant effects anticipated for $PM_{2.5}$ concentrations.

Compliance Receptors

13.10.109 The modelled compliance receptors in 2032 are presented in **ES Appendix 13.9.1: Air Quality Results Tables and Figures P5** (Doc Ref.5.3) with all modelled receptors shown in **ES Appendix 13.6.2: Air Quality Receptors** (Figure 2.2.1 to Figure 2.2.2) (Doc Ref.5.3).

13.10.110 The NO_2 and PM_{10} results show that the Project is not predicted to impact compliance with the air quality standards.

13.10.111 For $PM_{2.5}$ there is one location P_94, 95 (A23 London Road) in Croydon where the interim target of 12µg/m^3 is exceeded and a change of 0.1µg/m^3 is predicted. As noted for the human receptor results a review of traffic changes in those areas indicates the project is unlikely to change traffic in those areas and the changes are attributed to modelled traffic noise as detailed in Annex E of **ES Chapter 12: Traffic and Transport** (Doc Ref. 5.1). A A review of traffic changes in these areas indicates that airport traffic represents a very small proportion of traffic (less than 1%),

therefore it is not considered that the Project will impact on compliance with the air quality standards.

Ecological Receptors

13.10.112 Pollutant concentrations for annual mean NO_x and NH_3 are predicted at 316 sensitive ecological receptors for 2032.

Annual-mean NO_x concentrations

13.10.113 Predicted annual mean NO_x concentrations have been compared against the critical level of 30µg/m^3. Where the total predicted with scheme concentrations are below the critical level, then no significant effects would be anticipated at a site in relation to NO_x concentrations.

13.10.114 In the 2032 operational scenario, 58 and 59 receptors are predicted to experience concentrations above the critical level annual mean standard of NO_x of 30 µg/m^3, in the 'with' and 'without' Project scenarios, respectively. The results have been considered in **ES Chapter 9: Ecology and Nature Conservation** (Doc Ref.5.1) to determine significance.

Nitrogen Deposition

13.10.115 As a result of the Project, a change of 1% of the lower critical load criterion is predicted at 98 sites in 2032.

13.10.116 As the changes are greater than 1% of the critical level/ lower critical load, the assessment of effects has been considered in **ES Chapter 9: Ecology and Nature Conservation** (Doc Ref. 5.1) to determine significance. All other sites have a change of less than 1% compared to the critical level/ lower critical load and are therefore considered to be insignificant.

Acid Deposition

13.10.117 The change in acid deposition is predicted to be a maximum of 0.1 keq/ha/yr. The change in acid deposition falls within the critical load function for the site and therefore no significant acidity effects are anticipated.

13.10.118 The modelled results for ecological receptors for the interim assessment year (2032) are presented in **ES Appendix 13.9.1: Air Quality Results Tables and Figures P5** (Doc Ref. 5.3).

Habitats Regulation Assessment (HRA)

13.10.119 Air quality modelling has been carried out to enable a determination of whether the Project would cause likely significant effects on the integrity of European sites. For the purposes of the air quality assessment undertaken for the ES HRA, scenario years 2032 and 2038 have been assessed, with 2032 and 2038 traffic information used, respectively (**ES Appendix 9.9.1: Habitats Regulations Assessment Report** (Doc Ref. 5.3)).

13.10.120 NO_x concentrations for the 'with' Project scenario are predominately below the critical level, with exceptions for within 20m of major roads, ie, M25 at Thames Basin Heath and MGRE and the A3 at TAPC SAC.

13.10.121 Nitrogen deposition in all HRA sites within the main assessment (with just Project) has predicted exceedances of the 1% lower critical load criterion confined to within 20 m of the M25 and A3. For the cumulative assessment (with Project and local plans), all HRA sites have predicted

exceedances of the 1% lower critical load criterion more widespread, with exceedance up to 250 m from roadside at Thames Basin Heath SPA.

13.10.122 As the changes are greater than 1% of the critical level/ lower critical load, the assessment of effects has been considered in **ES Chapter 9: Ecology and Nature Conservation** (Doc Ref. 5.1) to determine significance.

13.10.123 The screening of likely effects due to the Project alone with respect to changes in air quality during operation of the Project did not identify any such effects for Ashdown Forest SAC/SPA, MGRE SAC or TAPC SAC in either assessment year.

13.10.124 The potential for likely significant effects was identified due to the Project alone with respect to the Ockham and Wisley Common SSSI component of the Thames Basin Heaths SPA due to changes in air quality during operation of the Project in both assessment years. As such, this impact was taken forward to Stage 3 Appropriate Assessment.

13.10.125 The screening of likely effects due to the Project in combination with other plans and projects with respect to changes in air quality during operation of the Project did not identify any such effects for MGRE SAC in either assessment year.

13.10.126 The potential for likely significant effects were identified due to the Project in combination with other plans and projects with respect to the Ockham and Wisley Common SSSI component of the Thames Basin Heaths SPA, TAPC SAC due to changes in air quality during operation of the Project.

Slow Fleet Transition Case

13.10.127 There are no changes to the magnitude of impact for all pollutants (NO_2, PM_{10} and $PM_{2.5}$) predicted in the slow fleet transition scenario for 2032. A change in aviation emissions in the SFT case does not have a large impact on predicted concentrations compared to the main assessment scenarios due to the distance from receptors.

Further Mitigation

13.10.128 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 is proposed.

Future Monitoring

13.10.129 Since no significant effects have been predicted for air quality in 2032, no additional monitoring beyond that included in the Project is proposed. Monitoring commitments are intended to be secured under the Section 106 Agreement to be entered in relation to the Project.

Significance of Effects

13.10.130 No further mitigation or monitoring is required and therefore the effects would remain as not significant.

Design Year: 2038

Emissions Inventory

13.10.131 Table 13.10.7 presents a summary of the estimated annual NO_x, PM_{10} and $PM_{2.5}$ emissions for the future 2038 assessment scenario for all sources across the study area. The change in emissions is compared to the 2038 future baseline without the Project in place, shown in Table 13.7.7.

13.10.132 Emissions have been estimated to be 3,664 t/yr for NO_x, 306 t/yr for PM_{10} and 184 t/yr for $PM_{2.5}$ in the design year of 2038 scenario. Airport-related emissions have been estimated to be 2,306 t/yr for NO_x, 49 t/yr for PM_{10} and 32 t/yr for $PM_{2.5}$.

13.10.133 When compared to the 2038 future baseline scenario (ie without the Project) (Table 13.7.7), it can be observed that the Project would result in an overall increase in emissions for all of the sources combined. The overall increase is due to increases in aircraft movements and associated activities on the airport, as well as increase in road traffic.

13.10.134 For airport-related PM_{10} and $PM_{2.5}$, the emissions are predicted to increase by 5 t/yr for PM_{10} and 4 t/yr for $PM_{2.5}$ for the design year in 2038 compared to the 2038 future baseline.

Table 13.10.7: Summary of Annual Pollutant Emissions for the Design Year 2038 (With Project)

Source	Emissions With Project			Change in Emissions		
	NO_x (t/yr)	PM_{10} (t/yr)	$PM_{2.5}$ (t/yr)	NO_x (t/yr)	PM_{10} (t/yr)	$PM_{2.5}$ (t/yr)
Aircraft in the air						
Approach	278.3	1.6	1.6	47.8	0.3	0.3
Initial climb	417.8	0.8	0.8	69.8	0.1	0.1
Climb out	534.0	1.3	1.3	92.8	0.2	0.2
Aircraft on the ground						
Landing	1.1	<0.1	<0.1	0.2	<0.1	<0.1
Reverse thrust	17.5	0.1	0.1	2.9	<0.1	<0.1
Taxiing	187.8	1.9	1.9	21.8	0.2	0.2
Hold	84.8	0.9	0.9	9.4	0.1	0.1
Take-off	493.4	1.1	1.1	84.6	0.2	0.2
Brake & tyre wear	N/A	8.4	4.3	N/A	1.5	0.7
APUs	82.3	1.8	1.8	14.7	0.3	0.3
Engine testing	0.8	<0.1	<0.1	0.1	<0.1	<0.1
Ground equipment						
GSE	9.6	1.6	0.8	-2.8	-0.5	-0.2
Fixed plant						
Fire training ground	0.1	<0.1	<0.1	<0.1	<0.1	<0.1

Source	Emissions With Project			Change in Emissions		
	NO_x (t/yr)	PM_{10} (t/yr)	$PM_{2.5}$ (t/yr)	NO_x (t/yr)	PM_{10} (t/yr)	$PM_{2.5}$ (t/yr)
Energy plant	19.0	0.1	0.1	-8.1	-0.1	-0.1
CARE facility	15.7	0.1	0.1	N/A	N/A	N/A
Car parks						
Car parks	4.5	0.5	0.4	1.9	0.2	0.2
Roads						
Airport	159.8	28.4	17.0	20.0	3.7	2.2
Non-airport	1357.5	257.1	151.8	-7.5	-1.3	-0.8
Total (all sources)	**3,664**	**306**	**184**	**363.4**	**5.2**	**3.7**
Total (airport-related)	**2,306**	**49**	**32**	**370.8**	**6.5**	**4.5**

Modelled Concentrations

Human Receptors

13.10.135 The modelled results for human receptors for the design year (2038) are presented in **ES Appendix 13.9.1: Air Quality Results Tables and Figures P6** (Doc Ref.5.3). All modelled human receptors are shown in **ES Appendix 13.6.2: Air Quality Receptors** (Figure 2.1.1 to Figure 2.1.5) (Doc Ref.5.3).

13.10.136 There are 57 receptors modelled in the Hazelwick AQMA. The highest annual mean NO_2 concentration within this AQMA is predicted to be 24.1 µg/m^3 at receptor R_562 at Woodfield Road. An increase of 0.1 µg/m^3 is predicted at this location. It is worth noting that around 97% of emissions at this receptor are not related to the airport, with 95% of traffic emissions being associated with non-airport traffic. The largest change in NO_2 concentrations, due to the Project in 2032 is predicted to be 0.3 µg/m^3 increase, at receptor R_538 located at Tinsley Lane, Crawley which has a With Project total of 22.4 µg/m^3.

13.10.137 There are 112 receptors modelled in the Horley AQMA. The highest annual mean NO_2 concentration is predicted to be 26.7 µg/m^3 at receptor R_480 located on Greenings, The Crescent, Horley. An increase of 0.5 µg/m^3 is predicted at this location. The largest change in NO_2 concentrations due to the Project in 2038 is predicted to be 1.3 µg/m^3, for example at receptor R_595 located at Vernon Woodroyd Gardens Horley which has the largest With Project total of 21.6 µg/m^3.

13.10.138 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.

13.10.139 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 36.7 µg/m^3 at receptor R_48 on Common Lane, close to the M25. 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 2038 is predicted to be 1.1 µg/m^3 at receptors CD_46 (committed development

with reference 20/01880/CONLA), R_177 (Povey Cross Road), R_179 (Charlwood Road), R_672 (Povey Cross Road Hookwood Horley) and EHO_2 (Povey Cross Rd). The maximum predicted concentration at these receptors is 17.8 µg/m^3 at receptor R_177 with the Project. There are negligible impacts predicted at all human receptors. Therefore, in 2038 due to the Project there are no significant effects anticipated for NO_2 concentrations.

13.10.140 There are no predicted exceedances of the PM_{10} objective in the do minimum or do something scenarios. The highest annual mean PM_{10} concentration is predicted to be 21.8 µg/m^3 at receptor R_48 on Common Lane, close to the M25. 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 <0.1 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}.

13.10.141 There are predicted exceedances of the $PM_{2.5}$ objective in the do minimum and do something scenario. The highest annual mean $PM_{2.5}$ concentration due to the Project is predicted to be 14.3 µg/m^3 at receptor R_48 on Common Lane. The largest change in annual $PM_{2.5}$ concentrations due to the Project in 2038 is predicted to be 0.2 µg/m^3, for example at receptor CD_77 located close to the M25 which has the largest With Project total of 10.4 µg/m^3. There are two slight adverse impacts predicted at receptor EHO_75 adjacent to A23 Airport Way and receptor R_302 on Mertsham Road. There are negligible impacts predicted at all other receptors. Therefore in 2038 there are no significant effects anticipated for $PM_{2.5}$ concentrations.

Compliance Receptors

13.10.142 The modelled compliance receptors in 2038 are presented in **ES Appendix 13.9.1: Air Quality Results Tables and Figures P6** (Doc Ref.5.3) with all modelled receptors shown in **ES Appendix 13.6.2: Air Quality Receptors** (Figure 2.2.1 to Figure 2.2.2) (Doc Ref.5.3).

13.10.143 The NO_2 and PM_{10} results show that the Project is not predicted to impact compliance with the air quality standards.

13.10.144 For $PM_{2.5}$ there is one location P_92, 93 (A235 London Road) in Croydon where the interim target of 12µg/m^3 is exceeded and a change of 0.1µg/m^3 is predicted. As noted for the human receptor results a review of traffic changes in those areas indicates the project is unlikely to change traffic in those areas and the changes are attributed to modelled traffic noise as detailed in Annex E of **ES Chapter 12: Traffic and Transport** (Doc Ref. 5.1). A review of traffic changes in these areas indicates that airport traffic represents a very small proportion of traffic (less than 1%), therefore it is not considered that the Project will impact on compliance with the air quality standards.

Ecological Receptors

13.10.145 Pollutant concentrations for annual mean NO_x and NH_3 are predicted at 316 sensitive ecological receptors for 2038.

Annual-mean NO_x Concentrations

13.10.146 Predicted annual mean NO_x concentrations have been compared against the critical level of 30µg/m^3. Where the total predicted with scheme concentrations are below the critical level, then no significant effects would be anticipated at a site in relation to NO_x concentrations.

13.10.147 In the 2038 operational scenario, 53 and 55 receptors are predicted to experience concentrations above the critical level annual mean standard of NO_x of 30 µg/m^3, in the ‘with’ and ‘without’

Project scenarios, respectively. The results have been considered in **ES Chapter 9: Ecology and Nature Conservation** (Doc Ref.5.1) to determine significance.

Nitrogen Deposition

13.10.148 As a result of the Project, a change of 1% of the lower critical load criterion is predicted at 91 receptors in 2038.

13.10.149 As the changes are greater than 1% of the critical level/ lower critical load, the assessment of effects has been considered in **ES Chapter 9: Ecology and Nature Conservation** (Doc Ref.5.1) to determine significance. All other sites have a change of less than 1% compared to the critical level/ lower critical load and are therefore considered to be not significant.

Acid Deposition

13.10.150 The change in acid deposition is predicted to be a maximum of 0.1 keq/ha/yr. The change in acid deposition falls within the critical load function for the site and therefore no significant acidity effects are anticipated.

13.10.151 The modelled results for ecological receptors for the design year (2038) are presented in **ES Appendix 13.9.1: Air Quality Results Tables and Figures P6** (Doc Ref.5.3).

Habitats Regulation Assessment (HRA)

13.10.152 For 2038, NO_x concentrations for the 'with' Project scenario are similar to 2032; receptor points are predominately below the critical level, with exceptions for within 20m of major roads, ie M25 at Thames Basin Heath and MGRE and the A3 at TAPC SAC.

13.10.153 Nitrogen deposition in the 2038 assessment year at all HRA sites within the main assessment (with Project) have predicted exceedances of the 1% lower critical load criterion, these are confined to areas within 20 m of the M25 and A3. For the cumulative assessment (with Project and local plans), predicted exceedances of the 1% lower critical load criterion at all HRA sites are more widespread, with exceedances up to 250 m from roadside at Thames Basin Heath SPA.

13.10.154 As the changes are greater than 1% of the critical level/ lower critical load, the assessment of effects has been considered in **ES Chapter 9: Ecology and Nature Conservation** (Doc Ref.5.1) to determine significance.

13.10.155 The screening of likely effects due to the Project alone with respect to changes in air quality during operation of the Project did not identify any such effects for Ashdown Forest SAC/SPA, MGRE SAC or TAPC SAC in either assessment year.

13.10.156 The potential for likely significant effects was identified due to the Project alone with respect to the Ockham and Wisley Common SSSI component of the Thames Basin Heaths SPA due to changes in air quality during operation of the Project in both assessment years. As such, this impact was taken forward to Stage 3 Appropriate Assessment.

13.10.157 The screening of likely effects due to the Project in combination with other plans and projects with respect to changes in air quality during operation of the Project did not identify any such effects for MGRE SAC in either assessment year.

13.10.158 The potential for likely significant effects were identified due to the Project in combination with other plans and projects with respect to the Ockham and Wisley Common SSSI component of the Thames Basin Heaths SPA, TAPC SAC and Ashdown Forest SPA/SAC due to changes in air quality during operation of the Project.

Slow Fleet Transition Case

13.10.159 There are no changes to the magnitude of impact for all pollutants (NO_2, PM_{10} and $PM_{2.5}$) predicted in the slow fleet transition scenario for 2038. A change in aviation emissions in the SFT case does not have a large impact on predicted concentrations compared to the main assessment scenarios due to the distance from receptors.

Further Mitigation

13.10.160 No significant effects for air quality are anticipated for 2038 as a result of the Project and therefore no further mitigation is proposed.

Future Monitoring

13.10.161 Since no significant effects have been predicted for air quality in 2038, no additional monitoring beyond that included in the Project is proposed. Monitoring commitments are intended to be secured under the Section 106 Agreement to be entered in relation to the Project.

Significance of Effects

13.10.162 No further mitigation or monitoring is required and therefore the effects would remain as not significant.

Future Year: 2047

13.10.163 Between 2047 and 2038 a number of predicted improvements to air quality would be expected to occur as a result of national efforts to reduce emissions and also as a result of the project.

13.10.164 Background concentrations would be anticipated to reduce due to national policy resulting in reductions in pollutant concentrations at a regional level.

13.10.165 Vehicle emissions, the key source of local pollutant emissions in the study area are shown to reduce due to improvements in vehicle technology and uptake of electric vehicles. The total emissions related to traffic associated with the airport reduce by 6% (for NO_x) between 2038 and 2047.

13.10.166 For aircraft, based on conservative assumptions, the emissions increase by 5% (for NO_x) between 2038 and 2047. This does not take into account commitments within the CAP (**ES Appendix 5.4.2: Carbon Action Plan**) (Doc Ref.5.3) aimed at reductions in aircraft emissions.

13.10.167 The trade off between vehicle emissions reductions and the conservative aircraft emissions increases result in an increase in emissions of 4% between 2038 and 2047 (for NO_x). Road traffic is the main source of emissions likely to result in a significant impact from the project due to the proximity of road sources to sensitive receptors, compared with aircraft emissions. Therefore, despite the uncertainty of predicting emissions for a future year of 2047, it has been concluded that the 2047 future year is not at risk of resulting in a significant impact to air quality.

13.10.168 As described in Section 13.9 of this ES Chapter, the CAP (**ES Appendix 5.4.2: Carbon Action Plan**) (Doc Ref.5.3) and Surface Access Commitments (SAC) (**ES Appendix 5.4.1: Surface Access Commitments**) (Doc Ref.5.3) will work together to facilitate emission reductions and improvements in air quality. The 2047 emissions inventory including aircraft and road vehicle emissions is presented in Table 13.10.8.

Emissions Inventory

13.10.169 Table 13.10.8 presents a summary of the estimated annual NO_x, PM_{10} and $PM_{2.5}$ emissions for the future 2047 assessment scenario for all sources across the study area. The change in emissions is compared to the 2047 future baseline without the Project in place, shown in Table 13.7.8.

13.10.170 Emissions have been estimated to be 3,713 t/yr for NO_x, 315 t/yr for PM_{10} and 190 t/yr for $PM_{2.5}$ in the future year of 2047 scenario. Airport-related emissions have been estimated to be 2,407 t/yr for NO_x, 48 t/yr for PM_{10} and 33 t/yr for $PM_{2.5}$.

13.10.171 When compared to the 2047 future baseline scenario (ie without the Project) (Table 13.7.8), it can be observed that the Project would result in an overall increase in emissions for all of the sources combined. The overall increase is due to increases in aircraft movements and associated activities on the airport, as well as increase in road traffic. For airport-related PM_{10} and $PM_{2.5}$, the emissions are predicted to increase by 3 t/yr for PM_{10} and 4 t/yr for $PM_{2.5}$ for the future year in 2047 compared to the 2047 future baseline.

Table 13.10.8: Summary of Annual Pollutant Emissions for the Future Year 2047 (With Project)

Source	Emissions With Project			Change in Emissions		
	NO_x (t/yr)	PM_{10} (t/yr)	$PM_{2.5}$ (t/yr)	NO_x (t/yr)	PM_{10} (t/yr)	$PM_{2.5}$ (t/yr)
Aircraft in the air						
Approach	288.9	1.6	1.6	44.2	0.3	0.3
Initial climb	442.0	0.8	0.8	66.4	0.1	0.1
Climb out	568.4	1.3	1.3	85.3	0.2	0.2
Aircraft on the ground						
Landing	1.1	<0.1	<0.1	0.2	0.0	0.0
Reverse thrust	18.3	0.1	0.1	2.7	<0.1	<0.1
Taxiing	193.7	2.0	2.0	18.8	0.2	0.2
Hold	87.5	0.9	0.9	8.1	0.1	0.1
Take-off	525.5	1.1	1.1	78.6	0.2	0.2
Brake & tyre wear	N/A	8.8	4.4	N/A	1.4	0.7
APUs	84.4	1.9	1.9	13.6	0.3	0.3
Engine testing	0.8	<0.1	<0.1	0.1	<0.1	<0.1
Ground equipment						
GSE	8.5	1.4	0.7	-3.6	-0.6	-0.3

Fixed plant						
Fire training ground	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Energy plant	18.3	0.1	0.1	-9.7	-0.1	-0.1
CARE facility	15.7	0.1	0.1	N/A	N/A	N/A
Car parks						
Car parks	4.4	0.5	0.4	2.0	0.2	0.2
Roads						
Airport	149.9	27.3	17.4	15.8	1.1	1.8
Non-airport	1305.6	266.7	156.9	-27.7	-0.9	-0.6
Total (all sources)	**3,713**	**315**	**190**	**310.6**	**2.6**	**3.3**
Total (airport-related)	**2,407**	**48**	**33**	**338.3**	**3.5**	**3.8**

Further Mitigation

13.10.172 No significant effects for air quality are anticipated for 2047 as discussed above, as a result of the Project and therefore no further mitigation is proposed.

Future Monitoring

13.10.173 Since no significant effects have been predicted for air quality in 2047, no additional monitoring beyond that included in the Project is proposed. Monitoring commitments are intended to be secured under the Section 106 Agreement to be entered in relation to the Project.

Significance of Effects

No further mitigation or monitoring is required and therefore the effects would remain as not significant.

Potential Changes to the Assessment as a Result of Climate Change

13.10.174 The potential changes to the air quality assessment as a result of climate change have been detailed in **ES Chapter 15: Climate Change** (Doc Ref. 5.1) and corresponding appendices. 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 period 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. This is due to mitigation which will be implemented during the construction period and due to the limited impact which would be expected during the operational period because whilst weather will have an impact the greatest impact comes from proximity to the source of pollution which would not alter.

Assessment of Odour Effects

13.10.175 This section provides the assessment of odour effects and potential changes to odour as a result of the Project. A summary of odour complaint information from the past five years is summarised along with a qualitative odour assessment of the operation of the Project.

Odour Complaints from the Past Five Years

13.10.176 This section provides a list of odour complaints in the last five years and the result of the Source Pathway Receptor assessment.

13.10.177 Data was requested from CBC, RBBC and GAL of any odour complaints received in the last five years, since 2018.

13.10.178 Complaints are submitted directly to the local planning authority. Few complaints are received per year. At the time of writing there were three formal complaints received by CBC, three by RBBC and 44 by GAL over the 5-year period. Complaints data from two of the formal complaints received by CBC and one formal complaint received by RBBC state the nature of the odour as aircraft fuel. The remaining complaints do not state the nature of the odour. An informal survey[ey] between 4th December 2019 and 28 January 2020 was also undertaken by a local resident at Horley Gardens Estate (at various locations to the north of the airport). Over the recorded period, 23 complaints were recorded over 15 days. The following section looks qualitatively at odour effects in the context of the odour complaint data.

13.10.179 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".

13.10.180 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.

13.10.181 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 would 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).

13.10.182 Data from the meteorological station at Gatwick shows that the predominant wind direction at the site is from the south west, as shown in the Wind Roses in Diagram 4.1.1 **ES Appendix 13.4.1: Air Quality Assessment Methodology** (Doc Ref.5.3). 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).

13.10.183 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.

Qualitative Odour Assessment for the Operational Period

13.10.184 A review of the design amendments for the water treatment works as part of the Project has been carried out. The works relate to management of water quality from surface run off containing de-icer. The water contained in the works would not be a risk to odour nuisance as it does not contain highly odorous or offensive contaminants. The site is located away from existing receptors. Therefore, the proposed works are considered to be not significant in relation to odour.

13.10.185 The CARE facility design is at the outline stage, however odour risk would be managed following best practice waste handling procedures. Following best practice methodology to contain and reduce odour effects from the facility no significant impacts would occur. No odour impacts would expect to occur from the plume as VOCs would be burnt off in the incineration process.

13.10.186 The Source Pathway Receptor assessment predicted a maximum of a medium odour risk from the apron as a result of aircraft emissions and additional use of fuel farms on-site. This is based on the worst case receptor located approximately 300m northeast and south (downwind locations) of the Project. The approach to assess overall risk has been determined following the method set out in the IAQM guidance (IAQM, 2018). According to the guidance, the pathway effectiveness has been defined as moderately effective and the Source Odour Potential has been defined as Medium. The interaction between the source odour potential, odour pathway and sensitivity of receptors have been used to derive a low risk of odour exposure. The Source Pathway Receptor assessment identified potential for slight adverse effects at community areas around the airport due to the pathway effectiveness, distance to receptor and source of emissions. The results table from the Source Pathway Receptor assessment is provided in **ES Appendix 13.9.1: Air Quality Results Tables and Figures – P3** (Doc Ref.5.3).

13.10.187 It is possible that local communities (namely Horley Gardens Estate) may experience occasional, short-term odour under specific weather conditions as a result of the increase in airport activity. At present, a limited number of complaints in relation to aviation fuel odour are currently received (odour complaints presented above). The number of odour complaints is considered likely to remain at a limited level due to the low frequency of the necessary meteorological conditions and medium odour source potential. Based on the above, the odour effect is therefore considered to be not significant.

13.10.188 In addition, best practice measures to mitigate odours from the airport are detailed in Section 13.9.

13.11. Cumulative Effects

13.11.1 This section sets out the results of the cumulative effects associated with the Project and other activities or proposed developments.

13.11.2 Air quality assessments are inherently cumulative, particularly with respect to traffic emissions. The traffic data used in the assessment of future years includes all planned growth in the with and without Project scenarios. Cumulative effects from other sources which affect the background ambient concentrations are taken into account from the Defra modelled background data used in the assessment (Defra, 2019a). All sources which could have a material impact are included.

13.11.3 The location of future development sites have been considered and added as receptors, noting that if existing receptors are closer to the key sources (roads or aviation) no new receptors are needed as worst case results are being predicted.

Zone of Influence

13.11.4 The zone of influence (ZoI) for air quality has been identified based on the spatial extent of likely effects. The ZoI is the same as defined in the Study Area (Section13.5).

Screening of Other Developments and Plans

13.11.5 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 ES chapter are based upon the results of a screening exercise undertaken as ‘art of the 'CE’ short list' of developments (**ES Appendix 20.4.1: Cumulative Effects Assessment Long and Short List** (Doc Ref.5.3)). Each development on the CEA long list has been considered on a case by case basis for scoping in or out of ’his chapter's assessment based upon data confidence, effect-receptor pathways and the spatial/temporal scales involved.

13.11.6 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 beenallocated into 'Tiers', reflecting their current stage within the planning and development process. Appropriate weight is therefore expected to be 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 **ES Chapter 20: Cumulative Effects and Inter-relationships** (Doc Ref. 5.1).

13.11.7 The specific developments scoped into the CEA for air quality are detailed in **ES Appendix 13.6.2: Air Quality Receptors** (Doc Ref.5.3) which shows the modelled receptors. All developments were considered as points where receptors could be located in future and worst case receptor locations were modelled. Cumulative effects in terms of traffic increases were included in the traffic data and so no additional assessment scenario was required. Full details of each of the modelled points is provided in **ES Appendix 20.4.1: Cumulative Effects Assessment Long and Short List** (Doc Ref. 5.3).

13.11.8 There are some developments within the 'CEA short list' which have not been explicitly modelled as a point in the ES. This is because 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. Therefore, the concentrations at the future receptor locations would be lower as the pollution would reduce away from the source.

13.11.9 Due to uncertainty around the third runway at London Heathrow Airport (Heathrow R3), this development has not been included in the main cumulative effects assessment. However, as Heathrow R3 remains Government policy, it has been considered separately and a qualitative assessment is provided in **ES Chapter 20: Cumulative Effects and Inter-relationships** (Doc Ref. 5.1)

Cumulative Effects Assessment

13.11.10 A description of the cumulative effects upon air quality receptors arising from each identified impact is given below.

Construction Periods: 2024 – 20–9 and 2029 - 2032

13.11.11 Road/air/surface 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 **(ES Appendix 5.3.2: CoCP** (Doc Ref.5.3)) and Construction Traffic Management Plan would 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 period 2024 to 2029 in terms of air quality.

Operational periods: 2029, 2032, 2038, 2047

13.11.12 Road/air/surface 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. As the assessment is inherently cumulative no further assessment is required. As the assessments were cumulative the conclusions of no significant effects would remain.

13.12. Inter-Related Effects

13.12.1 This ES Chapter assesses the significance of potential effects on air quality.

13.12.2 Inter-related effects from air quality could occur at ecological sites due to the in-combination effects from pollutants and other pressures. Therefore, the potential effects are assessed in **ES Chapter 9: Ecology and Nature Conservation** (Doc Ref.5.1).

13.12.3 Inter-related effects on climate related impacts have been assessed and reported in the **ES Chapter 15: Climate** (Doc Ref. 5.1) and **ES Chapter 16: Greenhouse Gases** (Doc Ref.5.1). In addition, Section 13.9 includes measures which will improve emissions to air and help reduce carbon so there is a dual benefit in many cases which is reflected as well in the Carbon Action Plan.

13.12.4 Air quality effects on health are included in **ES Chapter 18: Health and Wellbeing** (Doc Ref.5.1). This also covers a qualitative discussion of ultra-fine particulate matter.

13.12.5 The visual effects of the CARE plume are addressed in **ES Chapter 8: Landscape, Townscape and Visual Resources** (Doc Ref. 5.1).

13.12.6 The costs associated with air pollution to the economy are included in the Socio-economic Effects **ES Chapter 17: Socio-economic Effects** (Doc Ref. 5.1).

13.12.7 Inter-related effects on odour management are included in **ES Chapter 10: Geology and Ground Conditions** (Doc Ref. 5.1).

13.12.8 Further details of inter-related effects are provided in **ES Chapter 20: Cumulative Effects and Inter-relationships** (Doc Ref. 5.1).

13.13. Summary

13.13.1 The assessment undertaken for the ES for construction and operation concludes that no significant air quality effects are predicted.

13.13.2 The assessment has reviewed the future baseline situation to determine the scenario without the Project in operation and has taken into account all Project related effects and cumulative effects within the assessment for construction and operation.

13.13.3 Construction related effects from dust were identified as requiring mitigation following IAQM best practice guidance (IAQM, 2014). With mitigation, including monitoring (detailed in **ES Appendix 13.8.1: Construction Period Mitigation** (Doc Ref. 5.3)) in place effects from construction dust can be reduced to a negligible level with effects post mitigation being not significant.

13.13.4 Construction related equipment emissions were modelled and no significant effects were predicted. No further mitigation is required. The CAP sets out the emissions reductions outcomes that GAL commits to and outlines the actions that GAL could take in order to achieve such outcomes (**ES Appendix 5.4.2: Carbon Action Plan** (Doc Ref.5.3)).

13.13.5 Operational period impacts from airside and traffic related emissions (including the CARE facility) were predicted to be not significant. No further mitigation is required. Best practice measures to reduce emissions from the construction and operational periods are included in the Surface Access Commitments (SAC) (**ES Appendix 5.4.1: Surface Access Commitments** (Doc Ref.5.3)). The CAP sets out the emissions reductions outcomes that GAL commits to and outlines the actions that GAL could take in order to achieve such outcomes (**ES Appendix 5.4.2: Carbon Action Plan** (Doc Ref.5.3)). The conclusion of no significant impacts has been reached following a number of worst case assumptions, including conservative assumptions regarding the future fleet which does not take into account the reductions expected with the Transport Decarbonisation Plan (Department for Transport, 2021).

13.13.6 The Project recognises the non-thresholds effects at a population level for pollutants such as NO_2, PM_{10} and $PM_{2.5}$ (Public Health England, 2019), so there are health benefits to be gained from improving air quality even at concentrations below the standards. Health impact assessments consider the impacts at a population level in **ES Chapter 18: Health and Wellbeing** (Doc Ref. 5.1) of this ES. In order to reduce effects as far as practicable a summary of measures being undertaken is provided in Section 13.9 which will help improve air quality and monitor effects in the future.

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 Periods							
Human receptors and property	High	Dust deposition and increases in suspended particulate matter	Medium-term	Negligible to High	Not significant	Not significant in EIA terms	With the dust control measures set out in **ES Appendix 13.8.1: Construction Period Mitigation** (Doc Ref.5.3) and **ES Appendix 5.3.2: CoCP** (Doc Ref.5.3), effects would not be significant
Human receptors	High	Increase in pollutant concentrations	Medium-term	Slight Beneficial to moderate adverse with most changes being negligible	Not significant	Not significant in EIA terms	As described in the chapter the moderate and slight adverse impacts for $PM_{2.5}$ are due to modelled noise in the traffic data. Effects from the Project are considered to be 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	Determined within the ecological chapter (**ES Chapter 9: Ecology and Nature Conservation** (Doc Ref.5.1))	Not significant	Not significant in EIA terms	
First full year of operation 2029							
Human receptors	High	Increase in pollutant concentrations	Medium-term	Negligible	Not significant	Not significant in EIA terms	
Human receptors	High	Odour from operational activity	Medium-term	Slight adverse	Not significant	Not significant in EIA terms	
Ecological receptors	Medium	Increases in pollutant concentrations and deposition rates	Medium-term	Determined within the ecological chapter (**ES Chapter 9: Ecology and Nature Conservation** (Doc Ref.5.1))	Not significant	Not significant in EIA terms	

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							
Human receptors	High	Increase in pollutant concentrations	Medium-term	Negligible to Slight adverse	Not significant	Not significant in EIA terms	
Human receptors	High	Odour from operational activity	Medium-term	Slight adverse	Not significant	Not significant in EIA terms	
Ecological receptors	Medium	Increases in pollutant concentrations and deposition rates	Medium-term	Determined within the ecological chapter (**ES Chapter 9: Ecology and Nature Conservation** (Doc Ref.5.1))	Not significant	Not significant in EIA terms	
Design year 2038							
Human receptors	High	Increase in pollutant concentrations	Medium-term	Negligible	Not significant	Not significant in EIA terms	
Human receptors	High	Odour from operational activity	Medium-term	Slight adverse	Not significant	Not significant in EIA terms	
Ecological receptors	Medium	Increases in pollutant concentrations and deposition rates	Medium-term	Determined within the ecological chapter **(ES**	Not significant	Not significant in EIA terms	

Receptor	Receptor Sensitivity	Description of Impact	Short/medium/long term/permanent	Magnitude of Impact	Significance of Effect	Significant/not significant	Notes
				Chapter 9: Ecology and Nature Conservation (Doc Ref.5.1))			
Future year 2047							
Human receptors	High	Increase in pollutant concentrations	Medium-term	Not applicable	Not significant	Not significant	*Not modelled – emission inventory only.*
Human receptors	High	Odour from operational activity	Medium-term	Slight adverse	Not significant	Not significant in EIA terms	
Ecological receptors	Medium	Increases in pollutant concentrations and deposition rates	Medium-term	Not applicable	Not significant	Not significant	*Not modelled – emission inventory only.*

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13.15. Glossary

Table 13.15.1: Glossary of Terms

Term	Description
ADMS	Atmospheric Dispersion Modelling System
ANPS	Airports National Policy Statement
APIS	Air Pollution Information System
APU	Auxiliary Power Unit
AQAP	Air Quality Action Plan
AQMA	Air Quality Management Area
ARN	Affected Road Network
ATM	Air Transport Movements
CAA	Civil Aviation Authority
CAP	Carbon Action Plan
CARE	Central Area Recycling Enclosure
CBC	Crawley Borough Council
CEA	Cumulative Effects Assessment
CLF	Critical Load Function
CO	Carbon monoxide
CoCP	Code of Construction Practice
CTMP	Construction Traffic Management Plan
DCO	Development Consent Order – planning consent process for Nationally Significant Infrastructure Projects
Defra	Department of Environment, Food and Rural Affairs
DfT	Department for Transport
DLUHC	Department for Levelling Up, Housing and Communities
DMRB	Design Manual for Roads and Bridges
EA	Environment Agency
EFT	Emissions Factors Toolkit
EIA	Environmental Impact Assessment
EPUK	Environmental Protection UK
ES	Environmental Statement
EU	European Union
GAL	Gatwick Airport Limited – the company which operates Gatwick Airport
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
LNR	Local Nature Reserve
LTO	Landing and Take-off

Term	Description
MGRE	Mole Gap to Reigate Escarpment
MHCLG	Ministry of Housing, Communities and Local Government
N deposition	Nitrogen deposition
NAEI	National Atmospheric Emissions Inventory
NH_3	Ammonia
NHS	National Health Service
NNR	National Nature Reserve
NO_2	Nitrogen dioxide
NO_x	Oxides of nitrogen
NPPF	National Planning Policy Framework
NPPG	National Planning Practice Guidance
NNNPS	National Policy Statement for National Networks
NPS	National Policy Statement produced by Government
NSIP	Nationally Significant Infrastructure Project. Large scale projects as defined by the 2008 Planning Act
O_3	Ozone
OS	Ordnance Survey
PEI	Preliminary Environmental Information
PEIR	Preliminary Environmental Information Report
PC	Process Contribution
PCM	Pollution Climate Mapping
PINS	Planning Inspectorate
$PM_{0.1}$	Airborne particles that have a median diameter of 0.1 microns
PM_{10}	Airborne particles that have a median diameter of 10 microns
$PM_{2.5}$	Airborne particles that have a median diameter of 2.5 microns
RBBC	Reigate and Banstead Borough Council
SAC	Surface Access Commitments
Section 106 Agreement	2008 Section 106 legal agreement between Gatwick airport, West Sussex County Council and Crawley Borough Council
SFT	Slow Fleet Transition
SO_2	Sulphur dioxide
SoS	Secretary of State
TRA	Traffic Reliability Area
UFP	Ultrafine Particles
UK	United Kingdom
VOCs	Volatile Organic Compounds
WHO	World Health Organisation
ZoI	Zone of Influence