Gatwick Airport Northern Runway Project

Environmental Statement
Chapter 16: Greenhouse Gases – Tracked Version

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Table of Contents

Tables

Diagram

Appendices

ES Appendix 16.9.3: Assessment of Surface Access Greenhouse Gas Emissions

ES Appendix 16.9.4: Aviation Greenhouse Gas Emissions

16 Greenhouse Gases

16.1 Introduction

16.1.1 This Environmental Statement (ES) chapter presents the assessment of likely significant effects of greenhouse gas (GHG[1]) emissions on the global atmosphere associated with making best use of Gatwick Airport's existing runways and infrastructure (referred to within this report as 'the Project').

16.1.2 The ES chapter considers GHG emissions from four areas[2]:

- **construction:** arising from the extraction, processing, and manufacture of construction materials; transportation of these materials; the energy and water used during construction processes; transport and disposal of waste; and transport of construction workers. This category also considers impacts from land use change arising from the Project (ie removals and additions of habitat areas);
- **airport buildings and ground operations (ABAGO):** energy use for buildings, infrastructure, and operations to provide heating, cooling, lighting and power needs; fuels for airside and landside vehicles; electricity transmission and distribution emissions; refrigerant losses; fuels for fire training; water consumption and treatment; and operational waste disposal and treatment;
- **surface access:** of passengers, staff and freight accessing the airport; and
- **air traffic movements:** emissions from aircraft on the ground, in the Landing and Take-off (LTO) cycle, in Climb-Cruise-Descent (CCD) stage, and use of aircraft fuel for fire training and engine testing.

16.1.3 In particular, this ES chapter:

- sets out the existing and future environmental baseline conditions, established from desk studies and consultation;
- presents the potential environmental effects on the global atmosphere resulting from GHG emissions arising from the Project, based on the information gathered and the analysis and assessments undertaken;
- identifies any assumptions and limitations encountered in compiling the environmental information; and
- accounts for measures outlined in the Carbon Action Plan (CAP) and Surface Access Commitments (SAC) which are secured through the Development Consent Order (DCO) process.

16.1.4 This ES chapter is accompanied by the following appendices, which provide further detail on sources and assumptions as well a breakdown of GHG emissions annually:

- ES Appendix 16.2.1: Summary of Local Planning Policy for Greenhouse Gases (Doc Ref. 5.3);

[1] The 'basket' of GHGs defined under the Kyoto Protocol comprises carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), perfluorocarbons (PFCs), hydrofluorocarbons (HFCs), sulphur hexafluoride (SF_6) and nitrogen trifluoride (NF_3).
[2] Impacts from increasing airport capacity are presented across these four areas within the ANPS Para 5.74.

- ES Appendix 16.3.1: Summary of Stakeholder Scoping Responses for Greenhouse Gases (Doc Ref. 5.3)
- ES Appendix 16.9.1: Assessment of Construction Greenhouse Gas Emissions (Doc Ref. 5.3);
- ES Appendix 16.9.2: Assessment of Greenhouse Gas Emissions for Airport Buildings and Ground Operations (ABAGO) (Doc Ref. 5.3);
- ES Appendix 16.9.3: Assessment of Surface Access Greenhouse Gas Emissions (Doc Ref. 5.3); and
- ES Appendix 16.9.4: Aviation Greenhouse Gas Emissions (Doc Ref. 5.3).

16.2 Legislation and Policy

16.2.1 This section outlines the legislation and policy relevant to the assessment for GHG emissions.

Legislation

Infrastructure Planning (Environmental Impact Assessment) Regulations 2017

16.2.2 The Infrastructure Planning (Environmental Impact Assessment (EIA)) Regulations 2017 requires a description of the factors likely to be significantly affected by the development including climate (for example greenhouse gas emissions and impacts relevant to adaptation) (Schedule 4 (Para 4(4))) and a description of the likely significant effects of the development on the environment resulting from '*the impact of the project on climate (for example the nature and magnitude of greenhouse gas emissions)*' (Schedule 4 (para 5(f)).

Climate Change Act 2008

16.2.3 The amended Section 1 of the Climate Change Act 2008 sets a legally binding GHG emissions reduction target for the UK of 100% by 2050, compared to a 1990 baseline (the 'net zero' target). This revised target was introduced in 2019 as a change from the previous 80% reduction target. The Committee on Climate Change (CCC) recommends five-year national Carbon Budgets to achieve this target. To date the UK Government has adopted the recommended Carbon Budget level on each occasion it has been provided.

16.2.4 The establishment of Carbon Budgets responds to the Paris Agreement which provides for the international community to keep the increase in global average temperatures to well below 2°C above pre-industrial levels, and to pursue efforts to limit the temperature increase to 1.5°C. The UK's Nationally Determined Contribution to the United Nations Framework Convention on Climate Change (UNFCCC) in line with Article 4 of the Paris Agreement commits the UK to reducing economy-wide GHG emissions by at least 68% by 2030, compared to 1990 levels.

16.2.5 The most recent UK Carbon Budget recommendation is the Sixth Carbon Budget (Committee on Climate Change, 2022) covering the period 2033-37 which was the first to fully reflect the revised net zero target for 2050. The Sixth Carbon Budget was adopted by the UK Government in The Carbon Budget Order 2021. Following recommendations by the CCC the Sixth Carbon Budget formally includes emissions from international aviation within the target of 965 $MtCO_2e$, a 78% reduction on 1990 levels. Prior to this UK Carbon Budgets included only domestic aviation emissions and left 'headroom' within the budget for international aviation (and shipping) emissions.

16.2.6 The adoption of the legally binding net zero target in the UK under the Climate Change Act has recently been reflected for the transport and aviation sectors in the publication of the Transport Decarbonisation Plan (TDP) (Department for Transport, 2021), and by the Jet Zero Strategy (Department for Transport, 2022a). The latter sets out UK Government's framework and plan for achieving net zero aviation in the UK by 2050.

Greenhouse Gas Emissions Trading Scheme Order

16.2.7 The Greenhouse Gas Emissions Trading Scheme Order (2020) as amended by the Greenhouse Gas Emissions Trading Scheme (Amendment) Order 2022 provides the legislation which implements the UK Emission Trading Scheme (UK ETS). This is a cap-and-trade mechanism which covers domestic flights in the UK as well as flights from the UK to the European Economic Area (EEA), and to and from Gibraltar. It replaced, for the UK, the role of the EU ETS following the UK's exit from the European Union. The UK has consulted on how the UK ETS will integrate with wider industry initiatives to reduce GHG emissions (Department for Transport, 2021) – specifically the International Civil Aviation Organization's (ICAO) Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) which is a global market-based measure whereby offsetting is used to reduce sectoral emissions to agreed levels. The future role of the UK ETS to support the UK commitments under the Jet Zero Strategy (Department for Transport, 2022a) is also being considered, with any changes to the future trajectory of the UK ETS cap expected to take effect from 2024.

The Air Navigation (Carbon Offsetting and Reduction Scheme for International Aviation) Order 2021

16.2.8 The Air Navigation Order implements the monitoring, reporting and verification requirements of the CORSIA in Volume IV of Annex 16 to the Convention on Civil Aviation adopted by the Council of the ICAO on 27 June 2018. Under CORSIA a baseline level of carbon dioxide (CO_2) emissions is established for aeroplane operators undertaking international flights. Aeroplane operators must monitor and report emissions for each year.

Planning Policy Context

National Policy Statements

16.2.9 The Airports National Policy Statement (ANPS) (Department for Transport, 2018a), although primarily provided in relation to a new runway at Heathrow Airport, remains an important and relevant consideration for any airport nationally significant infrastructure project in the South East of England.

16.2.10 The ANPS provides guidance on the appraisal of GHG emissions for projects, and on the rationale for decision making with regards to the scale of these emissions. The document makes reference to the (then) 'planning assumption' of 37.5 $MtCO_2$ in 2050 as an effective upper-limit for sector emissions – although this assumption is considered no longer relevant as it has been superseded by the strategy and trajectory contained within the Jet Zero aviation policy for the UK.

16.2.11 The ANPS identified four emissions areas in which GHG/carbon impacts will arise from airport development: emissions caused by construction; emissions from airport buildings and ground operations; emissions from surface access for the airport; and increased emissions from air transport movements (ATMs).

16.2.12 Within guidance on decision making, the ANPS directs that 'any increase in carbon emissions alone is not a reason to refuse development consent, unless the increase in carbon emissions resulting from the project is so significant that it would have a material impact on the ability of Government to meet its carbon reduction targets, including carbon budgets' (Department for Transport, 2018a). It notes that decision making will also consider the extent to which mitigation has been employed to reduce impacts.

16.2.13 The National Policy Statement (NPS) for National Networks (Department for Transport, 2014) sets out the need for development of road, rail and strategic rail freight interchange projects on the national networks and the policy against which decisions on major road and rail projects will be made[3]. Its provisions for decision making in relation to carbon emissions provide a similar policy test to the ANPS. This has been taken into account in relation to the highway improvements proposed as part of the Project.

16.2.14 Table 16.2.1 provides a summary of the relevant requirements of these NPSs and how these are addressed within the ES.

Table 16.2.1: Summary of NPS Information Relevant to this Chapter

Summary of NPS Requirement	How and Where Considered in the ES
Airports NPS	
Paragraphs 5.69 and 5.70 state the Government's objective for the aviation sector to contribute to reducing global GHG emissions.	Both the scope of the assessment and the methodology are aligned with the NPS requirements.
Paragraphs 5.71 to 5.73 explain how the CCC leave a headroom in their five-year UK Carbon Budgets that account for international aviation.	
Paragraph 5.74 outlines the activities with potential to increase GHG emissions: air transport; airport buildings and ground operations; surface access; and construction.	
Paragraphs 5.76 and 5.77 provide guidance for the EIA process, including the scope and scenarios that should be covered.	The GHG assessment quantifies the GHG emissions arising as a result of the Project and provides an assessment of the impact of these on the global atmosphere by contextualising their scale and their contribution to achieving the UK Government's commitments on GHG emissions. The assessment quantifies the impacts including emissions from construction; emissions arising from airport buildings and

[3] The 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.

Summary of NPS Requirement	How and Where Considered in the ES
	ground operations including energy and fuel use; emissions from surface transport arising from passengers and staff accessing the airport, and due to commercial and retail freight vehicles; and emissions arising from aviation. Section 16.9 sets out the GHG emissions for the key reporting years.
Paragraphs 5.78 to 5.80 outline potential mitigation measures and state that *'the applicant is expected to take measures to limit the carbon impact of the project'.*	Section 16.8 along with the commitments in the **ES Appendix 5.4.2: Carbon Action Plan** (Doc Ref. 5.3) and **ES Appendix 5.4.1: Surface Access Commitments** (Doc Ref. 5.3) set out the environmental mitigation measures adopted for the Project. **ES Appendix 16.9.1: Assessment of Construction Greenhouse Gas Emissions** (Doc Ref. 5.3) and **ES Appendix 16.9.2: Assessment of Greenhouse Gas Emissions for Airport Buildings and Ground Operations (ABAGO)** (Doc Ref. 5.3) present both unmitigated and mitigated GHG emissions respectively for those topics where Gatwick Airport Limited (GAL) has a large degree of direct control.
Paragraphs 5.82 and 5.83 state: *'Any increase in carbon emissions alone is not a reason to refuse development consent, unless the increase in carbon emissions resulting from the project is so significant that it would have a material impact on the ability of Government to meet its carbon reduction targets, including carbon budgets.'* *'The Secretary of State's view of the adequacy of the mitigation measures relating to design, construction and operational phases will be a material factor in the decision-making process.'*	Section 16.9 presents and contextualises the GHG assessment results for each source (construction, ABAGO, surface access and aviation) in order to determine significance. Section 16.9 concludes by addressing the NPS's requirement to assess whether the Project has a material impact on the UK Government's ability to meet its carbon reduction targets including the UK Carbon Budgets.
NPS for National Networks	
Paragraphs 5.16 to 5.19 of the NPS are of relevance to the GHG assessment and are summarised below.	Section 16.9 assesses whether the Project has a material impact on the UK Government's ability to meet its carbon reduction targets.
Paragraph 5.16 states that the CCC's UK Carbon Budgets take into account an allowance for new national road infrastructure which is compatible with meeting the Climate Change Act target for 2050[4].	
Paragraph 5.17 explains that any carbon impacts should be included at the option appraisal stage	

[4] At the time of its production the UK Climate Change Act was targeting an 80% reduction by 2050.

Summary of NPS Requirement	How and Where Considered in the ES
and as part of the EIA for the DCO application, and that applicants should provide evidence of the carbon impacts and assess them against the Carbon Budgets.	
Paragraphs 5.18 and 5.19 explain how carbon increases from road development are included in the UK Carbon Budget and state the following: *'any increase in carbon emissions is not a reason to refuse development consent, unless the increase in carbon emissions resulting from the proposed scheme are so significant that it would have a material impact on the ability of Government to meet its carbon reduction targets.'* *'Evidence of appropriate mitigation measures (incorporating engineering plans on configuration and layout, and use of materials) in both design and construction should be presented. The Secretary of State will consider the effectiveness of such mitigation measures in order to ensure that, in relation to design and construction, the carbon footprint is not unnecessarily high. The Secretary of State's view of the adequacy of the mitigation measures relating to design and construction will be a material factor in the decision-making process.'*	Section 16.8 along with the commitments in the **ES Appendix 5.4.2: Carbon Action Plan** (Doc Ref. 5.3) and **ES Appendix 5.4.1: Surface Access Commitments** (Doc Ref. 5.3) set out the environmental mitigation measures adopted for the Project. **ES Appendix 16.9.1: Assessment of Construction Greenhouse Gas Emissions** (Doc Ref. 5.3) and **ES Appendix 16.9.2: Assessment of Greenhouse Gas Emissions for Airport Buildings and Ground Operations (ABAGO)** (Doc Ref. 5.3) present both unmitigated and mitigated GHG emissions respectively for those topics where GAL has a large degree of direct control.

National Planning Policy Framework

16.2.15 The National Planning Policy Framework (NPPF) (Ministry of Housing, Community and Local Government, 2021) sets out the planning policies for England. Chapter 14 of the NPPF sets out the approach to meeting the challenge of climate change.

16.2.16 Paragraph 157 states that: 'in determining planning applications, local planning authorities should expect new development to: a) comply with any development plan policies on local requirements for decentralised energy supply unless it can be demonstrated by the applicant, having regard to the type of development involved and its design, that this is not feasible or viable…'.

16.2.17 Paragraph 155 of the NPPF states that plans should help to increase the use and supply of renewable and low carbon energy and heat by providing a positive strategy for deriving energy from these sources; identifying suitable areas for renewable and low carbon energy sources; and identifying opportunities for the development to draw its energy supply from decentralised, renewable or low carbon energy supply systems and for co-locating potential heat customers and suppliers.

16.2.18 The GHG emissions methodology and assessment described in Sections 16.4 and 16.9 respectively have been developed in line with the NPPF guidance.

Other Relevant National Planning Policy

16.2.19 The UK Aviation Policy Framework (Department for Transport, 2013) outlines the Government's policy framework for the UK aviation sector. With respect to climate change, paragraph 12 states that the UK Government's objective is to: *'ensure that the aviation sector makes a significant and cost-effective contribution towards reducing global emissions'.*

16.2.20 In 2018 the Government consulted on its Aviation 2050 strategy (Department for Transport, 2018b), however due to the Covid pandemic it did not publish a formal response. Instead, the Flightpath to the Future (Department for Transport, 2022b) strategy was published which builds on the responses received from Aviation 2050 but also sets out a 10-point plan on how government and the aviation industry can work together to deliver a modern and innovative sector in the coming decade. A key element of the 10-point plan is supporting the development of sustainable aviation fuel (SAF) through £180 million of new funding and a SAF mandate, with the aim of reaching an aviation fuel mix with 10% SAF by 2030. This aligns with the Jet Zero Strategy (Department for Transport, 2022a) in delivering on the aspiration of net zero aviation emissions by 2050. In addition, government plans to scale up low carbon aircraft technology through funding and establishing research bodies such as the Future of Flight Industry Group.

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

16.2.21 2018 Beyond the Horizon - Making best use of existing runways (Department for Transport, 2018c) sets out the Government's support for airports (other than Heathrow) making best use of their existing runways subject to related economic and environmental considerations being taken into account.

Decarbonising Transport

16.2.22 Decarbonising Transport (the TDP) (Department for Transport, 2021) sets out the Government's approach to decarbonising the full transport sector in the UK. The strategic priorities included are across modal shift and active transport; decarbonisation of road transport; decarbonising the freight system; green transport technology and innovation; place-based solutions; and reducing carbon in the global economy.

16.2.23 The Plan sets out a wide range of commitments and actions to promote change across these priorities, many of which will directly seek to reduce GHG impacts arising from surface access, freight transportation, but also direct emissions from airports and, emissions from aircraft. The Plan confirms the UK Government's commitment to ensure continued access to affordable flights and seeks to align this with national carbon commitments through a range of commitments and strategic priorities including:

- consultation on a Jet Zero strategy, setting out the steps to be taken to reach net zero aviation emissions by 2050 (discussed further below);
- inclusion of international aviation in the Sixth Carbon Budget;
- the Jet Zero Council to support the delivery of global leadership on the production and commercialisation of SAF, supported by a potential mandate for blending SAF by 2025;
- consultation on a target for UK domestic aviation to meet net zero by 2040;
- focus on the acceleration of technical innovation in zero emissions aircraft technologies;
- research and development on zero emissions flight infrastructure at UK airports;
- supporting UK airspace modernisation;

- industry mechanisms to reduce sectoral emissions including further development of the UK ETS which covers flights within the EEA and flights to/from Gibraltar (potentially to consider other pollutants) and interaction with the global offsetting scheme for aviation, CORSIA;
- international leadership to agree a long-term global emissions reduction goal through the UN ICAO by 2022; and
- consideration of how existing market-based mechanisms (UK ETS and CORSIA), as well as the use of new GHG removal technologies, can address residual emissions.

16.2.24 The vehicle fleet emissions factors used in this assessment are provided within the methodological information detailed in **ES Appendix 16.9.3: Assessment of Surface Access Greenhouse Gas Emissions** (Doc Ref. 5.3)

Jet Zero Strategy: Delivering net zero aviation by 2050

16.2.25 Jet Zero Strategy: Delivering net zero aviation by 2050 (Jet Zero) (Department for Transport, 2022a) sets out the UK government's strategy for achieving net zero aviation emissions by the year 2050. The strategy includes a five-year delivery plan that sets out actions required to achieve next zero by 2050. Jet Zero introduces a GHG emissions reduction trajectory that would see emissions peak in 2019 and a "High ambition" trajectory of emissions falling to 35.4 $MtCO_2e$ in 2030, 28.4 $MtCO_2e$ in 2040, and 19.3 $MtCO_2e$ in 2050. Jet Zero states that carbon markets and greenhouse gas removals will be needed to address residual emissions and achieve net zero emissions and commits to support "sustainable airport growth". The Strategy states that the sector can achieve Jet Zero without the Government needing to intervene directly to limit aviation growth. It also notes that its underlying analysis indicates that current UK airport expansion plans (which include the Project) can be accommodated within the planned trajectory for net zero emission by 2050. Paragraph 3.57 states:

'…we can achieve Jet Zero without the Government needing to intervene directly to limit aviation growth. The analysis uses updated airport capacity assumptions consistent with the latest known expansion plans at airports in the UK.'

16.2.26 The Jet Zero Strategy is supported by its analytical analysis (referred to as the Jet Zero Strategy Dataset) which includes air transport movement projections and passenger projections to 2050, overlaid with four scenarios reflecting different rates of technological improvements. The strategy's six core policy measures are:

- Systems efficiencies – work to improve efficiency of existing aviation system. A target for all airport operations in England to be "zero emissions" by 2040. A Call for Evidence on the proposal was carried out in early 2023.
- SAF – £180 m in funding to support the development of the UK SAF industry. With a commitment to have at least five SAF plants under construction by 2025 and a SAF mandate of 10% SAF in the UK aviation fuel mix by 2030.
- Zero emissions flight – investment in industrial research and development, with the aim of zero emission routes connecting different areas of the UK by 2030.
- Markets and removals – aim to have legislation for the CORSIA in force no later than 2024. Working with the UK ETS Authority to enhance the effectiveness of the UK ETS.
- Influencing consumers – plan to publish a Call for Evidence on a proposal to provide consumers with environmental information at the time of booking in autumn 2022.
- Addressing non-CO_2 - aim to 'increase our understanding of non-CO_2 impacts as the exact scale of their effect remains uncertain.'

16.2.27 An important element of Jet Zero is that the emissions trajectory for the aviation sector will be monitored on an annual basis whilst the Strategy itself will be reviewed every five years. This acknowledges that decarbonisation will rely on new technologies which require time to develop and test. However, the Strategy explains (for example, on page 10) that the Government will intervene with new measures if the sector is not meeting its emissions trajectory.

Local Planning Policy

16.2.28 Gatwick lies within the administrative area of Crawley Borough Council and adjacent to the boundaries of Mole Valley District Council to the northwest, Reigate & Banstead Borough Council to the northeast and Horsham District Council to the southwest. The administrative area of Tandridge District Council is located approximately 1.9 km to the east of Gatwick, while Mid Sussex District Council lies approximately 2 km to the southeast. Gatwick is located in the county of West Sussex and adjacent to the county of Surrey.

16.2.29 The most relevant local planning policies applicable to climate change are listed in Table 16.2.2 and detailed further in **ES Appendix 16.2.1: Summary of Local Planning Policy – Greenhouse Gases** (Doc Ref. 5.3). For some environmental topics that have informed this ES chapter, a wider study area has been used and policies in local plans over a wider area have been considered, where appropriate.

Table 16.2.2: Local Planning Policy

Administrative Area	Plan	Administrative Area
Adopted Policy		
Crawley	Crawley 2030: Crawley Borough Local Plan 2015-2030	ENV6: Sustainable design and construction
		GAT1: Development of the Airport with a Single Runway
		SD1: Presumption in favour of sustainable development
		ENV7: District energy networks
Reigate and Banstead	Reigate & Banstead Local Plan: Core Strategy 2014 (Reviewed 2019)	CS10: Sustainable development
		CS11: Sustainable construction
	Reigate & Banstead Development Management Plan 2019	CCF1: Climate change mitigation
	Reigate & Banstead Borough Council Climate Change and Sustainable Construction Supplementary Planning Document 2021	Planning Applications: Carbon Reduction Statement
Mole Valley	Mole Valley Core Strategy 2009	CS19: Sustainable Construction, Renewable Energy and Energy Conservation
Horsham		Policy 35: Climate change
		Policy 36: Appropriate energy use

Administrative Area	Plan	Administrative Area
	Horsham District Planning Framework 2015	Policy 37: Sustainable design and construction
Tandridge	Tandridge District Core Strategy 2008	CSP14: Sustainable construction
		CSP15: Environmental quality
Mid Sussex	Mid Sussex District Plan 2014-2031	DP39: Sustainable Design and Construction
Emerging Policy		
Crawley	Submission Draft Crawley Borough Local Plan 2021-2037	Strategic Policy SD1: Presumption in Favour of Sustainable Development
Mole Valley	Future Mole Valley 2020-2037 Consultation Draft Local Plan	Policy S2: Combatting the Climate Emergency
		Policy EN13: Standards and Targets for combatting the climate emergency
Horsham	Draft Horsham District Local Plan 2021-2036	Strategic Policy 1: Sustainable Development
		Strategic Policy 37: Climate Change
Tandridge	Our Local Plan: 2033	TLP45: Energy Efficient & Low Carbon Development
Mid Sussex	Mid Sussex District Plan 2021-2039 Consultation Draft	DPS1: Climate Change
		DPS2: Sustainable Design and Construction
		DPT5: Off-Airport Car Parking

16.3 Consultation and Engagement

16.3.1 In September 2019, GAL submitted a Scoping Report (Gatwick Airport Ltd, 2019a) to the Planning Inspectorate (PINS), 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 which are proposed to be scoped out of the EIA process and provided justification as to why the Project would not have the potential to give rise to significant environmental effects in these areas. The Scoping Report is provided in **ES Appendix 6.2.1: Scoping Report** (Doc Ref. 5.3).

16.3.2 Following consultation with the statutory bodies, PINS (on behalf of the Secretary of State) provided a Scoping Opinion on 11 October 2019 (Planning Inspectorate, 2019). The **Scoping Opinion** is provided in **ES Appendix 6.2.2** (Doc Ref. 5.3).

16.3.3 Key issues raised by the PINS during the scoping process specific to GHG are presented in Table 16.3.1 together with details of how these issues have been taken into account within the ES. Details of consultation responses are provided in **ES Appendix 16.3.1: Summary of Stakeholder Scoping Responses for Greenhouse Gases** (Doc Ref. 5.3).

Table 16.3.1: Summary of PINS Scoping Responses

Details	How and Where Considered in the ES
The Inspectorate considers that a cumulative assessment should be undertaken, to take into consideration other plans or projects which could result in significant cumulative GHG emissions.	The nature of greenhouse gases is that their impact is not affected by the location of their source. Emissions from proposed developments adjacent to Gatwick are no more relevant than emissions elsewhere in the UK. The measure of cumulative emissions at a national scale is carried out by the setting of, and monitoring against, UK climate budgets. Comparison with UK climate budgets is included in this ES in Section 16.9. Further information on the approach to cumulative assessment is set out in Section 16.10.
The baseline should be presented within the ES, with appropriate referencing to the existing reports.	The current and future baselines for the assessment are set out in Section 16.6.
The ES should provide a clear definition for each of the different 'scopes' of emissions reported.	The ES makes reference to 'scopes' in Section 16.4 where they are referenced and a definition for each is provided. However, GAL does not consider the use of 'scopes' supports a clear assessment of the GHG impacts of the Project (albeit they do provide context for the mitigation of emissions). The remainder of the ES chapter, and the supporting appendices, illustrate which emissions fall within responsibility of GAL as airport operator, which arise from other parties, and which arise from aircraft.
The Inspectorate acknowledges that technological advances of aircraft, and thus changes to emissions, are difficult to predict with confidence. The Inspectorate welcomes the intention to adopt pessimistic, best practice and central projections for future aviation improvements. The Applicant should ensure that the assumptions made in all GHG calculations (for both construction and operational phases) are clearly set out in the ES.	Since the production of the Scoping Report (Gatwick Airport Limited, 2019a) the UK Government has produced the Jet Zero Strategy (Department for Transport, 2022a). This provides the Government's committed trajectory for UK aviation (the High Ambition trajectory), and as such this scenario has been used to model the assessment for the Project. This chapter of the ES provides details on the methodology adopted, presented in Section 16.4. Assumptions are set out in Section 16.5.
The ES should assess all types of GHGs which have the potential to contribute to a likely significant effect on climate, and clearly set out the conversion methodology and assumptions where tCO_2e metrics are used.	The ES reports the quantification of Kyoto-emissions in Section 16.9. Non-Kyoto emissions have not been quantified within the ES. Further information is included in Section 16.4 to explain why non-Kyoto emissions are excluded.

Details	How and Where Considered in the ES
The Inspectorate would expect to see the 'worst case' year presented as a separate assessment scenario which should be considered against a do-nothing scenario for that same year.	An assessment of the 'worst-case' year for GHG emissions, and a comparison against the future baseline, is included in Section 16.9.
Therefore, the difference in GHG emissions from the 'do-nothing' and 'do-something' scenarios will be calculated and will be compared against relevant Carbon Budgets. The ES should assess the likely significant effects associated with any increase in GHG emissions as a result of the Proposed Development and with reference to relevant legislation and sector specific Carbon Budgets.	The ES presents the absolute magnitude of emissions and the difference between these emissions and the future baseline conditions (in the absence of the Project). Emissions are then assessed against the relevant Carbon Budgets. The reported impacts take into account best available knowledge of the impacts and innovations in reducing emissions from aircraft (technological improvements in aircraft and changes in fuels) reflecting the assumptions and commitments within the UK Jet Zero Strategy (Department for Transport, 2022a).
The ES should quantify the GHG impacts before and after mitigation to show the anticipated effectiveness of the proposed mitigation. Any mitigation relied upon to reduce the significance of effect should be demonstrably secured.	Section 16.8 presents the mitigation measures adopted as part of the Project, which include those in the **ES Appendix 5.4.2: Carbon Action Plan** (Doc Ref. 5.3) and **ES Appendix 5.4.1: Surface Access Commitments** (Doc Ref. 5.3). Section 16.9 presents the GHG assessment results which incorporate such mitigation measures whilst **ES Appendix 16.9.1: Assessment of Construction Greenhouse Gas Emissions** (Doc Ref. 5.3) and **ES Appendix 16.9.2: Assessment of Greenhouse Gas Emissions for Airport Buildings and Ground Operations (ABAGO)** (Doc Ref. 5.3) present the unmitigated scenario, so showing the anticipated magnitude of the emissions reductions as a result of the mitigation measures.

16.3.4 The Preliminary Environmental Impact Assessment (PEIR) was issued to inform the statutory consultation carried out on the Project in autumn 2021. This was prior to the publication of the Jet Zero and Flightpath to the Future strategies, both published in 2022 (Department for Transport, 2022a and Department for Transport, 2022b respectively). It presented the preliminary findings of the EIA process for the Project at that time. Table 16.3.2 summarises the key thematic consultation responses to the PEIR relating to the GHG assessment and how these are addressed in the ES. Additional information on the consultation process for the Project and the way the consultation responses have been had regard to in the development of the DCO Application is provided in the **Consultation Report** (Doc Ref. 6.1).

Table 16.3.2: Summary of Consultation in Response to the PEIR

Consultee	Key Themes	How and Where Considered in the ES
Local Authorities	What is the scope of the GHG assessment and assessment methodology adopted?	Section 16.4 presents the assessment methodology which aligns with best practice, along with an explanation behind which GHG-emitting activities at the airport are scoped in. All major emitting activities are included: construction, airport building and ground operations, surface access, and aviation.
	How do the GHG emissions from the Project align with UK decarbonisation / net zero aspirations?	Section 16.9 presents the assessment of GHG effects. Emissions from construction, airport building and ground operations, surface access, and aviation are all individually contextualised with UK national carbon budgets as well as relevant sectoral carbon projections. This method of contextualising GHG emissions aligns with IEMA guidance on GHG and the EIA process (Institute of Environmental Management and Assessment, 2022).
	What mitigation is proposed?	Section 16.8 presents the mitigation measures adopted as part of the Project, which include those in **ES Appendix 5.4.2: Carbon Action Plan** (Doc Ref. 5.3) and **ES Appendix 5.4.1: Surface Access Commitments** (Doc Ref. 5.3). Section 16.9 presents the GHG assessment results which incorporate such mitigation measures whilst **ES Appendix 16.9.1: Assessment of Construction Greenhouse Gas Emissions** (Doc Ref. 5.3) and **ES Appendix 16.9.2: Assessment of Greenhouse Gas Emissions for Airport Buildings and Ground Operations (ABAGO)** (Doc Ref. 5.3) present the anticipated effectiveness of such mitigation measures.

Consultee	Key Themes	How and Where Considered in the ES
	Are GHG emissions from both inbound and outbound flights considered?	Section 16.4 (Accounting for International Aviation Emissions) addresses which phases of both inbound and outbound flights are included in the GHG assessment and the reasoning behind the methodology adopted.

16.3.5 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 Preliminary Environmental Information (PEI) document was issued as part of this additional consultation.

16.3.6 The **Consultation Document** (Doc Ref. 6.1) produced in June 2022 specifically discussed the emerging Jet Zero Strategy from UK Government; the Jet Zero Strategy was undergoing consultation at that point in time. The airport capacities assumed in the Government's assessment in support of Jet Zero incorporating known airport expansion plans/commitments included the Northern Runway Project at Gatwick[5]. The Consultation Document also noted the intention to evolve the modelling approach taken at PEIR and propose a more realistic approach, taking into account the effect of, and to be consistent with, the measures assumed in the Jet Zero Strategy and the technical interventions underpinning the strategy's High Ambition scenario. Additionally, as stated in the **Consultation Document** (Doc Ref. 6.1), GAL has developed a CAP to mitigate emissions within its control (**ES Appendix 5.4.2: Carbon Action Plan** (Doc Ref. 5.3)).

16.3.7 The consultation responses specific to the GHG assessment and the way in which they have been taken into account in this ES chapter are set out in Table 16.3.3. Further detail about the consultation process for the Project and way the consultation responses have been taken into account is provided in the **Consultation Report** (Doc Ref. 6.1).

Table 16.3.3: Summary of Consultation in Response to the Updated PEI

Consultee	Key Themes	How and Where Considered in the ES
Local authorities	The additional GHG emissions from the Project should be monetised / costed.	**ES Chapter 17: Socio-Economics** (Doc Ref. 5.1) includes a monetised assessment of the costs and benefits of the Project including GHG emissions. The values used for this are in line with the latest Department for Transport guidance in its Transport Analysis Guidance (Department for Transport, 2022c).

[5] Jet Zero strategy dataset supporting its aviation scenarios available online here: https://www.gov.uk/government/publications/jet-zero-strategy-delivering-net-zero-aviation-by-2050#:~:text=Details,can%20bring%20to%20the%20UK%20.

Consultee	Key Themes	How and Where Considered in the ES
	How do the GHG emissions from the Project align with UK decarbonisation / net zero aspirations?	Section 16.9 presents the assessment of GHG effects. Emissions from construction, airport building and ground operations, surface access, and aviation are all individually contextualised with UK national carbon budgets as well as relevant sectoral carbon projections. This method of contextualizing GHG emissions aligns with IEMA guidance on GHG and the EIA process (Institute of Environmental Management and Assessment, 2022).
	Uncertainty around the Government's Jet Zero Strategy for aviation.	Jet Zero provides the framework for UK Government to meet its commitment to achieve net zero for the UK aviation sector, including the ability to amend the policy levers it will deploy in order to ensure a net zero position for the aviation sector by 2050. This includes monitoring progress against the net zero target annually and a review of the strategy every five years. Section 16.2 summarises the Jet Zero Strategy (Department for Transport, 2022a) and its core policy measures.
	How are non-CO_2 climate impacts addressed?	Section 16.4 (Non-CO_2 Impacts) addresses the approach within the assessment to the consideration of radiative forcing / non-CO_2 climate impacts.
	Carbon trading schemes are not appropriate to alleviate emissions.	Section 16.2 outlines the role of offsets and trading schemes in the wider aviation sector. The government's Jet Zero Strategy (Department for Transport, 2022a) sets out a framework and plan on achieving net zero aviation in the UK by 2050. **ES Appendix 5.4.2: Carbon Action Plan** (Doc Ref. 5.3) presents a hierarchy of carbon mitigation measures which include offsets/trading schemes in accordance with the Jet Zero Strategy.
	The Project should consider low-carbon design measures such as solar panels and electric vehicles.	**ES Appendix 5.4.2: Carbon Action Plan** (Doc Ref. 5.3) sets out outcomes that GAL is committed to, in order to reduce carbon emissions across construction. The CAP explains that: '*All new buildings constructed as*

Consultee	Key Themes	How and Where Considered in the ES
		part of the Project will be designed and constructed for Net Zero emissions during operation'.

16.3.8 Outside of the above-described public consultations, the Applicant also continued to engage with key stakeholders and during such engagement, key issues raised during consultation and engagement with interested parties specific to GHG are listed in Table 16.3.4, together with details of how these issues have been addressed within the ES.

Table 16.3.4: Summary of Consultation and Engagement

Consultee	Date	Details	How taken into account in ES
Local Authorities			
Crawley Borough Council, Reigate & Banstead Borough Council, Mole Valley District Council, West Sussex County Council, Surrey County Council, Horsham District Council, Mid Sussex County Council, East Sussex County Council, Kent County Council	28 August 2019	Meeting of local authorities, GAL and air quality, climate change and GHG topic leads. Clarification sought on the scope of GHG emissions assessment for aircraft. Additional information was provided to the local authority which made the enquiry.	No change was made to the scope of the assessment in response to this.
Wider Stakeholders			
Brighton and Hove City Council, Wealden District Council, Sevenoaks District Council, Royal Borough of Windsor and Maidenhead, Greater London Authority, Highways England, Historic England, Charlwood Parish Council, Horley Town Council	3 September 2019	Meeting to set out scope of EIA topic assessment for air quality, climate change and carbon topics	No issues arose for the assessment of GHG.
Crawley Borough Council, Reigate & Banstead Borough Council, Mole Valley District Council, West Sussex County Council, Surrey County Council, Horsham District Council, Mid Sussex District Council	27 January 2020	The purpose of the meeting was to provide an update on emerging findings of the assessment (at that time), ahead of the then planned formal statutory consultation in spring 2020.	Whilst questions were asked about the assessment no further issues arose for the GHG assessment.
Crawley Borough Council, Surrey County Council, Reigate &	12 August 2021	The purpose of the meeting was to provide an update on emerging	Whilst questions were asked about

Consultee	Date	Details	How taken into account in ES
Banstead Borough Council, Tandridge District Council, Horsham District Council, Mid Sussex District Council, East Sussex County Council, Kent County Council, West Sussex County Council		findings of the assessment ahead of the formal statutory consultation in autumn 2021.	the assessment no further issues arose for the assessment.
(Topic Working Group (TWG) Meeting) Crawley Borough Council, Reigate & Banstead Borough Council, Mole Valley District Council, Tandridge District Council, Horsham District Council, Mid Sussex District Council, East Sussex County Council, Surrey County Council, West Sussex County Council, Kent County Council and Wealden District Council	3 September 2022	The purpose of the meeting was to provide an update on the ongoing work to inform the ES, including to: ▪ present the carbon assessment methodology, building on the autumn 2021 and summer 2022 consultation documentation; ▪ present results of assessments and proposed mitigation measures; and ▪ respond to local authority comments on the autumn 2021 and summer 2022 consultations regarding the carbon topic.	Whilst questions were asked about the assessment no further issues arose for the assessment.
(TWG Meeting) Crawley Borough Council, Reigate & Banstead Borough Council, Mole Valley District Council, Tandridge District Council, Horsham District Council, Mid Sussex District Council, East Sussex County Council, Surrey County Council, West Sussex County Council, Kent County Council and Wealden District Council	12 December 2022	Detail requested on the scope of mitigation to be delivered via the CAP.	**ES Appendix 5.4.2: Carbon Action Plan** (Doc Ref. 5.3) sets out all the mitigation measures.

16.4 Assessment Methodology

Relevant Guidance

16.4.1 In addition to the requirements of the EIA Regulations, the following guidance relevant to GHG assessments has been considered:

- The Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance, 2nd Edition (Institute of Environmental Management and Assessment, 2022);
- The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (World Business Council for Sustainable Development and World Resources Institute, 2015);
- Net zero – the UK's contribution to stopping global warming (Committee on Climate Change, 2019);
- The Sixth Carbon Budget (Committee on Climate Change, 2022);
- PAS 2080 Carbon Management in Infrastructure (British Standards Institute, 2016)[6];
- BS EN 15978 Sustainability of construction works (British Standards Institute, 2011);
- The Royal Institution of Chartered Surveyors Methodology to calculate embodied carbon (The Royal Institution of Chartered Surveyors, 2014);
- Whole life carbon assessment for the built environment (The Royal Institution of Chartered Surveyors, 2017);
- Scope of carbon budgets: Statutory advice on inclusion of international aviation and shipping (Committee on Climate Change, 2012);
- EMEP/EEA Air Pollution Inventory Guidebook (European Environment Agency, 2019);
- CORSIA (Carbon offsetting and Reduction Scheme for International Aviation) (International Civil Aviation Organisation, 2016);
- ICAO Aircraft Engine Emissions Databank (European Union Aviation Safety Agency, 2021); and
- Fifth Assessment Report (AR5) Synthesis Report (Intergovernmental Panel on Climate Change, 2014).

Scope of the Assessment

Context of the Assessment

16.4.2 The scope of the GHG assessment considers several factors including:

- changes in demand and activity of various types arising from the Project, and the extent to which these generate GHG emissions;
- expected national policy across aviation, transport, construction, and energy sectors that will impact upon demand for specific services and activities, but that will also impact on the average *GHG intensity* of activities – ie the typical quantity of emissions per unit of activity; and
- activities undertaken by GAL in the form of either measures within the design of the Project, or binding commitments, to mitigate demand levels and GHG emissions in future.

[6] Note that an update to PAS2080 was published during production of this ES. While it does not materially impact upon the assessment method contained herein this document does not reflect the full extent of the 2023 update.

16.4.3 A key consideration in respect of the GHG assessment is the context set out in the ANPS that states clearly that:

'Any increase in carbon emissions alone is not a reason to refuse development consent, unless the increase in carbon emissions resulting from the project is so significant that it would have a material impact on the ability of Government to meet its carbon reduction targets, including carbon budgets. (Para 5.82)'

16.4.4 The assessment therefore seeks to understand the scale of changes in GHG emissions and the materiality of these on the ability of the UK Government to meet its climate obligations.

16.4.5 In addition, the assessment seeks to further consider the context and impact of changes in GHG emissions with reference to two additional considerations:

- Firstly, with regards to mitigation undertaken by GAL as part of the Project and the extent to which GAL has sought to reduce, or commits to reduce, GHG impacts (where it has the ability to). This reflects the decision-making principle in paragraph 5.83 of the ANPS that notes that the adequacy of mitigation measures will be a material factor in the decision-making process.
- Secondly, the guidance contained in the IEMA Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance (Institute of Environmental Management and Assessment, 2022) encourages the contextualisation of GHG emissions arising from a Project in terms of their alignment with trajectories towards the UK's net zero target in 2050.

16.4.6 Specifically with regards to UK national strategy the assessment considers the implications of the Jet Zero Strategy (Department for Transport, 2022a), that sets out how the UK intends to achieve net zero in the aviation sector, aligning with the UK's wider net zero target. The UK Government has committed to achieving the 'High Ambition scenario' presented in the Jet Zero Strategy. This scenario is predicated on a range of mechanisms to reduce aircraft emissions (including improvement in aircraft efficiency, uptake of sustainable aviation fuels, and use of zero emission aircraft) and commits to managing emissions from aircraft so as to achieve residual emissions of 19.3 $MtCO_2e$ in 2050 which are to be offset or removed.

16.4.7 Similarly to the approach to aviation strategy, the assessment also considers the impact of the UK TDP that sets out the UK Government's commitment to decarbonise transport in the UK by 2050.

16.4.8 Both the Jet Zero High Ambition scenario, and the UK TDP, set out policy commitments that are predicated on specific rates of transition to lower emissions technologies. The quantification approach adopted for the GHG assessment is based on these rates of transition being delivered (for example the assessment of aviation impacts assumes a level of uptake of SAF that aligns with the modelled assumption in the Jet Zero High Ambition scenario).

16.4.9 Finally, the assessment considers where GAL has formally committed to targeted GHG reductions (for areas within GAL control) in future years. These commitments apply to emissions from construction and ABAGO (where GAL has a significant degree of control) and to surface transport (where GAL is committed to delivering a range of surface access commitments). The commitments made by GAL are set out in **ES Appendix 5.4.2: Carbon Action Plan** (Doc Ref. 5.3) and **ES Appendix 5.4.1: Surface Access Commitments** (Doc Ref. 5.3).

Emissions Sources within the scope of the GHG Assessment

16.4.10 The sources of emissions considered within the GHG assessment has been developed in consultation with relevant statutory and non-statutory consultees and is summarised in Table 16.4.1.

Table 16.4.1: Emissions Sources included within the Assessment

Activity	Potential Effect
GHG Emissions Assessment: Construction Phase	
GHG emissions arising from construction and demolition activities within the existing airport boundary, and construction of upgraded highway junctions and any other buildings/infrastructure outside the airport boundary included in the Project description	GHGs arising from the extraction, processing and manufacturing of construction materials.
	GHGs arising from transportation of materials from factory to site.
	GHGs arising from energy use in construction activities (ie operation of plant etc).
	GHGs arising from transport and disposal of construction and demolition waste.
	GHGs arising from surface access for construction staff arising from the Project.
GHG emissions arising from Land use change associated with construction of the Project	GHGs arising from the removal of habitats within the construction zone for the Project, and subsequent sequestration of GHGs within newly created areas of habitat.
GHG Emissions Assessment: Operational Phase	
GHG emissions arising from air transport	GHGs arise from aircraft in the LTO phases for: ▪ flights departing Gatwick: taxi-out; take-off roll; initial climb; climb-out (to 915 m[7]); and ▪ flights landing at other airports from Gatwick-departing flights (from 915 m); landing roll; reverse thrust; taxi-in.
	GHGs arising from departing flights in CCD phase.
	GHGs arising from aviation fuel use in Auxiliary Power Units (APUs).
	GHGs arising from aviation fuel use for Aircraft Engine Testing.
GHG emissions arising from surface access journeys from employees, passengers, and freight	GHGs arising from passenger surface access (rail, road).
	GHGs arising from staff surface access (rail, road).
	GHGs arising from freight surface access (rail, road).
GHG emissions arising from airport buildings and ground operations	GHGs arising from electricity, natural gas, biomass, and diesel/petrol consumption. These fuels are consumed by buildings and airport infrastructure providing heating, cooling, lighting, and power needs.
	GHGs arising from fuel used for airside and landside land vehicles.
	GHGs arising from the use and accidental release of refrigerants.
	GHGs arising from the use of propane and wood/straw for fire training.

[7] 3,000 ft

Activity	Potential Effect
	GHGs arising from the consumption of potable water supply and water effluent treatment.
	GHGs arising from airport waste disposal and treatment, including waste arisings from terminals, aircraft, cargo, catering, and other associated businesses.

16.4.11 For the assessment of GHG emissions, no effects have been scoped out of the assessment. The assessment includes GHGs as set out in the Kyoto Protocol, and the resultant international commitments and UK legislation, and considers emissions in terms of CO_2e.

Non-CO_2 Impacts

16.4.12 The issue of Radiative Forcing (RF) and non-CO_2 impacts[8] from aviation are recognised in corporate reporting guidance in the UK, are referenced within the Sixth Carbon Budget (Committee on Climate Change, 2022) and are discussed in the recent Jet Zero Strategy produced by the UK Government (Department for Transport, 2022a).

16.4.13 The Jet Zero Strategy explicitly addresses non-CO_2 emissions impacts noting the importance of the issue, and the limitations that exist around quantifying and assessing impact. It notes that a key element of the aviation strategy – use of sustainable aviation fuels – is likely to reduce some impacts associated with soot particles. The Strategy further commits UK Government to develop an appropriate regime to quantify and understand non-CO_2 impacts and potential mitigation and then, to develop and implement policies to reduce these impacts.

16.4.14 Whilst the likelihood of these contributing to changes in climate is acknowledged, given that there remains no well-established methodology for quantifying non-CO_2 emissions impacts, and there is uncertainty on how to identify the magnitude of their impact, this assessment does not attempt to quantify non-GHG and RF effects of emissions at altitude. Providing a comparative set of figures alongside the CO_2 emissions would be incompatible with an assessment against national CO_2 targets, and as noted above, the generalised approach to providing CO_2 equivalent estimates to reflect the combined impact of different GHGs is not transferrable to non-CO_2 emissions.

Accounting for International Aviation Emissions

16.4.15 There is currently no internationally agreed way of allocating international aviation CO_2 emissions to individual countries. However, the UNFCCC provides a recommended approach, which is to allocate aviation emissions to the country of departure. The UK emissions inventory does not currently include international aviation emissions in the emissions total for the UK, although they are included as an additional memorandum item (in line with international reporting protocols under the UNFCCC).

16.4.16 The approach adopted in the ES has been to include within the scope of the assessment the emissions associated with outward flights only. This approach takes into account the taxi out and take-off from Gatwick, the CCD aloft emissions for those outward flights, and the land and taxi-in emissions at the other airport. This effectively allocates emissions to the departing airport location

[8] More accurately described as non-Kyoto greenhouse gas emissions

(even though the emissions relating to land and taxi-in will in fact arise away from Gatwick) and avoids double counting at a national and international level. This is detailed in Table 16.4.2.

Table 16.4.2: Scope of Aviation Emissions included in the Assessment

Outward Flights (departing from Gatwick and arriving at another airport)			Inward Flights (departing from another airport and arriving at Gatwick)		
Taxi out and take-off from Gatwick	**CCD aloft for outward flights**	**Landing and taxi in at other airport**	**Taxi out and take-off from other airport**	**CCD aloft for inward flights**	**Landing and taxi in at Gatwick**
Included in the assessment	Included in the assessment	Included in the assessment	Excluded from the assessment	Excluded from the assessment	Excluded from the assessment

16.4.17 The calculation method adopted for each of these is detailed in **ES Appendix 16.9.4: Aviation Greenhouse Gas Emissions** (Doc Ref. 5.3).

Considering Emissions 'Scopes' under GHG Protocol

16.4.18 The GHG Protocol: A Corporate Accounting and Reporting Standard (World Business Council for Sustainable Development and World Resources Institute, 2015) defines three 'scopes' of emissions that are used for corporate reporting. Broadly these scopes can be summarised as follows.

- **Scope 1:** direct emissions of GHGs from plant, equipment, vehicles owned by the reporting corporate entity (eg combustion of natural gas, vehicle fuels, and emissions of refrigerants).
- **Scope 2:** indirect emissions of GHGs associated with purchased electricity, steam, heating and cooling (purchased by the reporting corporate entity).
- **Scope 3:** other GHG emissions arising from the activities of the organisation including those associated with construction, transportation and distribution, waste, water, business travel, employee commuting.

16.4.19 Reporting the emissions for the Project against these scopes is complex (and of limited value for this ES) as the GHG Protocol is intended as guidance for corporate reporting, and the Project incorporates emissions from multiple corporate entities. As an example, the use of aviation fuel for a flight is a Scope 1 emission for the operating airline but would be classed as a Scope 3 emission for GAL (were GAL to report it). For this reason, limited reference is made to which emissions fall under Scopes 1/2/3, but where this reference is made it is from the perspective of the most relevant corporate reporting entity, GAL.

Study Area

16.4.20 The study area for the GHG assessment considers the emissions of GHG arising from the construction and operation of the Project, some of which are emitted within the site boundary, but the majority of which are emitted outside of the boundary. This covers both construction and operational emissions as summarised in the list below.

- For construction emissions, the physical scope extends to the extraction and sourcing of materials nationally and internationally, as well as construction processes within the Project

site boundary. Transportation of waste, and transport of workers to the Project also take place outside the Project site boundary.
- For the operational phase, emissions arise from the energy, waste arisings and water consumed within the Project site boundary. However, many of the upstream emissions associated with these (eg energy for electricity generation and potable water treatment) are outside the physical boundary of the Project site.
- Emissions from aviation and from surface access during operation also arise primarily outside the physical boundary of the Project site.

Assessment Methodology

16.4.21 The general approach to estimating GHGs for the Project has been to adopt a conservative assessment of emissions to avoid under-estimation of impact. GHG emissions are calculated using the formula:

Activity x GHG factor = carbon emissions

where:

- **activity data** – a measure of the quantity of an activity; and
- **GHG factor** – a measure of the GHG emissions per unit of activity.

16.4.22 Both activity data and GHG factors change over time. This is due to changes in demand (eg changing numbers of passengers using the airport) and due to changes in the underlying policies and technologies that support an activity (eg the national car fleet having an increasing proportion of electric vehicles). For some activities the demand levels, and the GHG factors, can be influenced by GAL (eg GAL might implement a public transport initiative to encourage passengers to travel by train instead of car).

16.4.23 Activity data depend on the specific activity being assessed and the way they are quantified, eg:

- fuel consumption is typically quantified in litres or tonnes;
- energy consumption is typically quantified in kWh;
- transport activity is typically measured in vehicle km or passenger km; and
- construction materials and waste are quantified in m^3 or tonnes.

16.4.24 GHG factors are drawn from a range of national and international sources. Where these factors are expected to change over the duration of the Project then a time-based factor is used, based on estimating the extent and rate at which the factor will change. This estimation process draws on industry standards, industry-specific guidance, and a range of other UK and government policy and strategy documents.

16.4.25 The baseline year for the GHG assessment is the calendar year 2018[9]. The GHG assessment draws together several different emissions analyses but for ease, and comparability, a single common baseline year was identified so as to enable a single aggregated GHG emissions baseline. Generally, baseline year activity data reflect actual usage and consumption in the calendar year 2018 as recorded by GAL or other parties. Data has been collected from several sources including corporate reporting (Gatwick Airport Ltd, 2019b), and historic flight records from

[9] 2018 is being used for the GHG assessment to align with other topics assessed using common modelling years and outputs, most pertinently Air Quality assessment work developed on the 2018 modelled road traffic data.

Gatwick. For some activities (eg operation of buildings not owned/managed by GAL) it has been necessary to seek data from those third party operators. For some elements within the assessment the 2018 baseline GHG emissions are derived from a wider modelling exercise (eg for surface access emissions) because this provides for a common dataset with other topics[10].

16.4.26 In the absence of actual consumption data for some specific activities it has been necessary to draw on benchmark information to understand typical operations. A full list of data sources is set out in each of the relevant appendices accompanying this ES chapter. A conservative approach has been adopted throughout the assessment to avoid as far as possible under-estimation of GHG emissions whilst also seeking to reflect where there are legal and policy frameworks that will change demand and carbon factors in the future.

16.4.27 The future baseline GHG emissions (in the absence of the Project) are based on developing forecasts of activity data without the Project. In some cases, these are developed by scaling the 2018 baseline activity data linearly using forecasts of passenger numbers, or forecasts of flight levels. In other cases, future modelling is more complex – most importantly for surface access and aviation.

Construction Methodology

16.4.28 Construction of the airport facilities, and changes to the supporting highway network, would result in the generation of GHG emissions. These impacts would include the production of GHGs arising from:

- the extraction, processing and manufacturing of construction materials;
- transportation of construction materials;
- energy and fuel use in construction activities;
- transport and disposal of construction waste; and
- surface access by construction staff.

16.4.29 Construction quantities have been obtained across three main project elements: airport infrastructure; buildings; and highways improvements. For each of these, the physical material quantities have been identified from costing data or from information contained within **ES Chapter 5: Project Description** (Doc Ref. 5.1). These are then used with standard and industry appropriate benchmark data to estimate GHGs associated with construction.

16.4.30 In addition to costing data other aspects of the assessment (construction plant energy use and surface access by construction staff) have been developed based on the Project workforce planning schedule that indicates the numbers and types of construction staff on site for each month of the construction programme.

16.4.31 The assessment then seeks to consider the impacts of the CAP, which commits GAL to a reduction in construction emissions that would be achieved through a range of measures including design optimisation, material substitution, and construction process efficiencies. Under the CAP GAL commits to delivering construction of the airfield, buildings, and highways works within a carbon budget of 1.15 $MtCO_2e$, representing a 17% reduction on the estimated emissions if typical construction materials and practices were used.

[10] It should also be noted that the CAP uses 2019 data to provide the most up-to-date information to inform carbon management commitments as these provide a more up-to-date dataset for specific emissions categories.

16.4.32 In addition to the impacts associated with the construction of physical infrastructure the development of the Project would also result in GHG emissions associated with land use change. These arise because areas of existing land contain carbon (in various forms) in the soils themselves and in the plants and vegetation present upon them. As areas of landscape are disturbed, removed, or engineered the carbon stocks within them can be released to the atmosphere. However, construction would also create new areas of habitat which would be expected to sequester carbon year-on-year following their creation and – over time – much or all of the carbon released from land during construction could be sequestered in these new landscape areas.

16.4.33 To estimate the impacts of land use change the assessment draws on the areas of habitat across the site before and after construction takes place. Average carbon store values are used for each unit area of habitat type, and the carbon (and GHGs) released through construction are estimated. The calculation is then carried out for the post-development habitat areas, assuming a 30-year maturation period over which carbon would be sequestered in soils and vegetation.

16.4.34 Further information on the approach to quantify construction impacts can be found in **ES Appendix 16.9.1: Assessment of Construction Greenhouse Gas Emissions** (Doc Ref. 5.3).

Airport Buildings and Ground Operations Methodology

16.4.35 ABAGO emissions encompass a range of energy and fuel uses across the airport site from a range of different operating parties. ABAGO emissions include:

- electricity use in GAL buildings and infrastructure;
- electricity use by 3rd parties operating within the airport boundary;
- transmission and Distribution losses associated with electricity supplies to the airport;
- fuel use (diesel, gas, petrol) used in GAL plant and vehicles;
- fuel use (diesel, gas, petrol) in third party plant and vehicles;
- emissions associated with the supply of potable water to the airport;
- emissions associated with the treatment and disposal of wastewater arising from the airport;
- waste management from the airport;
- materials and fuels used during fire training at the airport; and
- refrigerant losses from mechanical cooling plant across the airport.

16.4.36 Baseline ABAGO emissions have been calculated through two main methods:

- development of an energy model spanning 2017 to 2050 that models electricity use and fuel use; and
- direct use of recorded water supply, wastewater generation, waste generation, fire training material consumption, and refrigerant loss records for 2018.

16.4.37 Input data for the energy model was obtained from metered consumption (where available) for energy and fuel: fuels, water, waste, and refrigerants for the energy model baseline year[11]:

- Baseline electricity consumption includes GAL power usage for lighting, baggage systems, lifts and escalators, safety systems, IT and controls, ventilation systems, cooling systems, and fixed electrical ground power (FEGP).

[11] The energy model underpinning the assessment is based on baseline recorded data from 2017 which then provides a modelled set of consumption values for the assessment baseline year of 2018.

- Baseline gas consumption is taken from metered data, integrated with benchmark data where required to allow representative baseline consumption.
- Baseline fuel consumption was collected for diesel, petrol and gas oil consumption.
- Energy and fuel consumption for third parties has been derived from metered data (where GAL has access to this), via data requests to third parties; or using benchmark consumption values where no data is available.
- Consumption of potable water, and quantities of wastewater and waste management are based on recorded data for 2018.
- Quantities of combustible materials for fire training are taken from corporate GHG reporting for 2018.
- Estimated release of refrigerants are taken from corporate GHG reporting for 2018.

16.4.38 Future estimated ABAGO emissions have been developed in the absence of the Project to reflect known buildings work and incorporating a background level of improvements to energy performance across the existing airport. The measures within the future baseline include:

- Implementing additional solar-PV where feasible and financially viable for integration into new or existing facilities.
- Implementing energy efficiency measures in existing buildings where technically practical and financially viable, including measures such as LED light replacements, installation of variable speed drives, and improvements in ventilation, insultation and heat recovery systems.
- Improving heat generation and supply efficiencies as older gas boilers and heat networks are replaced.
- Improving cooling efficiencies as existing chillers and cooling networks are replaced.
- Some electrification of vehicles and ground support equipment.
- Improved building regulations for new buildings.
- Decarbonisation of the UK electricity grid.

16.4.39 Future energy demand would also change to reflect growth in passenger numbers and ATMs forecast in the absence of the Project.

- Electrical power, cooling power, and heat energy consumption have been scaled for future years based on changes in passenger numbers.
- Electrical power, cooling power, and heat energy consumption have additionally been scaled to reflect changes in building internal areas (reflecting some construction works and some reconfiguration of spaces).
- Energy for vehicle fuel use has been scaled for future years based on ATM numbers.
- Potable water, wastewater, and waste management have been scaled based on future passenger numbers.
- Emissions arising from refrigerant losses are hard to predict but have been estimated based on future cooling energy demands.
- Fire training fuel demands are assumed to remain constant.

16.4.40 ABAGO modelling has also been developed for the future with-Project scenario adopting a similar approach to that set out above but reflecting increased passenger numbers and ATMs to reflect forecasts under the Project. Similar to the future baseline without the Project, demand for power, heat, fuels, water, wastewater, waste management, and refrigerants has been scaled based on the forecast passenger numbers, ATMs, and increases in building floor areas for the Project.

16.4.41 Further information, and the full without-Project and with-Project demands can be found in ES Appendix 16.9.2: Assessment of Greenhouse Gas Emissions for Airport Buildings and Ground Operations (ABAGO) (Doc Ref. 5.3).

16.4.42 The assessment also considers the commitments made by GAL to mitigate the impacts from those areas of ABAGO over which GAL has control. The commitments are included within the CAP and commit GAL to:

- achieving net zero for GAL Scope 1 and 2 by 2030; and
- achieving zero emissions for GAL Scope 1 and 2 by 2040.

16.4.43 Through the CAP, GAL commits to the identified outcomes but given the rapid development of technology and best practice, seeks to maintain flexibility in the specific measures and trajectory under which they will be achieved. GAL's commitment to deliver these outcomes are not dependent on the success of the Project's DCO Application and are accordingly reflected in the future baseline assessment as well (and which avoids overstating the emissions reduction as part of the Project); however, the CAP is proposed to be secured under the DCO to provide an additional level of assurance to stakeholders.

16.4.44 The out-turn positions by 2030 and 2040 apply for both the without-Project and with-Project scenarios.

16.4.45 GAL has commissioned modelling to inform development of the CAP that provides indicative routes to achieve the Scope 1 and 2 targets by 2030 and 2040 respectfully for the without-Project scenario. One illustrative scenario has been adopted to inform this assessment – a scenario that sees widespread introduction of heat pumps across the airport to support provision of heating and hot water. This scenario also includes for the integration of on-site renewables, and the securing of supplies (from wind and solar) via private-wire and similar agreements to allow GAL to make use of zero carbon electricity at the airport.

16.4.46 The assessment considers the likely emissions from the airport, and the net changes in overall GHG emissions from the airport, assuming these commitments are also in place for the without-Project scenario.

16.4.47 Further information, and the full without-Project energy demands and other ABAGO emissions, and incorporating the Scope 1 and 2 CAP commitments, can be found in **ES Appendix 16.9.2: Assessment of Greenhouse Gas Emissions for Airport Buildings and Ground Operations (ABAGO)** (Doc Ref. 5.3).

Surface Access Methodology

16.4.48 For surface access, future forecasts are derived from the strategic transport modelling undertaken for the wider project appraisal. This differs from the GHG assessment for surface access at PEIR stage – when the strategic transport model outputs were not available. At PEIR stage emissions were estimated using travel survey data for Gatwick and estimated transport distances between major cities. The strategic modelling approach improves the quality of estimated travel distances and modes and has been used on this basis. Using modelling outputs also ensures alignment between the GHG assessment and other topics that rely on strategic traffic modelling (e.g. noise and air quality).

16.4.49 The strategic modelling provides estimated vehicle numbers and distances for specific assessment years. The GHG assessment then interpolates between these years to provide a year-by-year time series.

16.4.50 Surface access is one area where the main data for the baseline year – 2018 – are taken from the strategic transport model, rather than from measured data for 2018.

16.4.51 Estimating GHG emissions from surface access relies on adopting an appropriate carbon factor to reflect the mix of fossil fuel and electric vehicles within the UK vehicle fleet. Baseline emissions for 2018 are calculated using standard UK Government conversion factors.

16.4.52 The assessment also considers other exogenous effects affecting emissions, most notably the expected change in road vehicle usage away from fossil fuels to electric vehicles (to reflect the rates presented in the TDP). Further information can be found in **ES Appendix 16.9.3: Assessment of Surface Access Greenhouse Gas Emissions** (Doc Ref. 5.3).

Aviation Methodology

16.4.53 The projected emissions from aviation are primarily driven by the forecasts of passengers, ATMs, and flight routes in future years. These combine to provide a profile (both without and with the Project) of how many flights would take place, operating which routes, and using which aircraft. Further detail of ATM and passenger number forecasts is provided in **ES Chapter 5: Project Description** (Doc Ref. 5.1).

16.4.54 The forecasted aircraft projections assume the transition to a proportion of new aircraft over time and see a shift towards aircraft with increased engine efficiency. This is modelled over two-time phases:

- the period to 2038 - based on the modelled fleet transition expected at Gatwick; and
- the period after 2038 to 2050 - modelled on an average per-year fleet efficiency improvement.

16.4.55 The modelling of future emissions from aviation have been modelled based on the assumptions adopted for the UK aviation industry contained within the Jet Zero High Ambition scenario, which is the scenario adopted by UK Government as part of their future trajectory commitment. This incorporates three technical considerations that have informed the modelling process:

- **Average annual aircraft efficiency improvements:** the average per-year fleet improvement for the period beyond 2038 is taken from the Jet Zero High Ambition scenario which assumes an efficiency improvement of 2% per year.
- **Uptake and incorporation of SAF:** the forecast of aviation emissions also assumes the use of SAF in the future that aligns with the UK Jet Zero Strategy High Ambition scenario. This assumes the inclusion of a proportion forecast to reach 10% by 2030, 22% by 2040, and 50% by 2050.
- **Introduction of zero emission aircraft:** Jet Zero is based on considering new aircraft technologies that will be introduced from 2035 and will be increasingly used across the aviation fleet, reaching 27% of ATMs by 2050[12].

[12] The proportion of ATMs using zero emission aircraft in each year of the assessment is set out in **ES Appendix 16.9.4: Aviation Greenhouse Gas Emissions** (Doc Ref. 5.3).

16.4.56 It should be noted that the inclusion of these three technical considerations has only been applied within this GHG assessment within the ES, and not within the Air Quality assessment nor the Noise assessment. This allows the GHG chapter to align with government policy on net zero within the aviation sector while also allowing other topics to comply with their respective best practice approaches to deliver a conservative assessment of future impacts. This distinction has been made as the impacts on future aviation emissions at national scale will be set by government policy, whilst the noise and air quality effects of the future fleet are less certain.

16.4.57 Aviation emissions are modelled in two portions:

- The LTO phase modelling is based on the assessment of specific engine types and their usage around the airport. This is detailed in the Air Quality assessment and further information can be found on this modelling approach in **ES Chapter 13: Air Quality** (Doc Ref. 5.1).
- The CCD phase is modelled using the EMEP/EEA Aviation Master Emissions Calculator 2019 contained within the EMEP/EEA air pollutant emission inventory guidebook (European Environment Agency (2019).

16.4.58 The main assessment of aviation emissions is based on the common set of forecasts for passengers and ATMs set out in **ES Chapter 5: Project Description** (Doc Ref. 5.1). These forecasts represent the changes in passenger numbers and the changes in flights, aircraft types, and flight routes under both the without-Project and the with-Project scenarios. The GHG assessment considers the impacts of changes to the aircraft fleet serving Gatwick – this is relevant to the assessment because newer aircraft have significantly different performance in terms of fuel consumption, and furthermore the blend of aircraft types and the distances they fly are fundamental to the calculation of GHG emissions. Further information on these forecasts can be found in **ES Appendix 4.3.1: Forecast Data Book** (Doc Ref. 5.3).

16.4.59 In addition, a sensitivity case has been considered for the Slow Fleet Transition (SFT) scenario under which newer aircraft are not brought into service as quickly as in the main scenario. The impact of this on GHG is that the profile of future emissions changes would change, with the benefits of fleet change (in terms of reduced emissions) being delayed. This potential scenario also has implications for other environmental topics including Noise and Air Quality. The GHG assessment includes an appraisal of the likely changes in the impact assessment that would arise under this SFT. More information on the SFT can be found in **ES Appendix 4.3.1: Forecast Data Book** (Doc Ref. 5.3).

16.4.60 Further information on the assessment methodology can be found in **ES Appendix 16.9.4: Aviation Greenhouse Gas Emissions** (Doc Ref. 5.3).

Modelling Future Baseline Emissions

16.4.61 The scaling approach for future without-Project demand and/or emissions is summarised in Table 16.4.3.

Table 16.4.3: Scaling Approach for Future Baseline Emissions

Emissions Source	Scaling Methodology for Future Baseline
Construction	

Emissions Source	Scaling Methodology for Future Baseline
GHGs arising from the extraction, processing and manufacturing of construction materials	Future baseline emissions from construction are based on planned construction in the absence of the Project, which will include an extension to Pier 6, construction of two multi-storey car parks, and the extension to South Terminal International Departures. Based on key aspects of the Project and building footprints, estimates of construction materials have been developed using typical building benchmarks. These have then been used to estimate construction plant energy and other emissions associated with construction activities.
GHGs arising from transportation of materials from factory to site	
GHGs arising from energy use in construction activities (eg operation of plant)	
GHGs arising from transport and disposal of construction and demolition waste	
Loss of carbon sink from soil organic carbon and changes arising from removal/addition of ground vegetation	The future baseline is assumed to be zero for changes arising from land use as the nature of the proposed construction is not expected to impact significantly on existing habitats.
ABAGO	
GHGs arising from electricity, natural gas, biomass, and fuel consumption associated with the use of Airport buildings and infrastructure	Electrical power, cooling power, and heat energy consumption have been scaled for future years based on changes in passenger numbers. Electrical power, cooling power, and heat energy consumption have additionally been scaled to reflect changes in building internal areas (reflecting some construction works and some reconfiguration of spaces). Some improvement to the existing estate in terms of energy efficiency of buildings and plant has been accounted for. Some introduction of cost-effective renewable energy technologies has been accounted for.
GHGs arising from fuel used for airside land vehicles and ground support equipment	The future baseline has been developed by scaling 2018 airside land vehicle fuel use by forecast passenger numbers in the absence of the Project.
GHGs arising from the use and accidental release of refrigerants	The future baseline has been developed by scaling 2018 refrigerant losses to reflect changes in expected cooling demand within the energy model.
GHGs arising from the use of propane and wood/straw for fire training	Future consumption of materials and fuels for fire training are kept at a constant level in future years.
GHGs arising from the consumption of potable water supply and water effluent treatment	The future baseline has been developed by scaling 2018 water supply emissions by forecast passenger numbers in the absence of the Project.
GHGs arising from Airport waste disposal and treatment, including waste arisings from terminals, aircraft, cargo, catering, and other associated businesses	The future baseline has been developed by scaling 2018 waste management emissions by forecast passenger numbers in the absence of the Project.

Emissions Source	Scaling Methodology for Future Baseline
Surface access	
GHGs arising from passenger surface access (rail, road)	The future baseline has been developed using outputs from the strategic transport model for future years in the absence of the Project. The future baseline incorporates improvements in the carbon intensity of road and rail transport in line with the UK TDP in the form of greater proportions of electric vehicles, and improvements in vehicle efficiency.
GHGs arising from staff surface access (rail, road)	
GHGs arising from freight surface access (rail, road)	The future baseline has been developed by scaling 2018 estimated freight transport by the forecast increases in cargo freight tonnage in the absence of the Project. Retail freight impacts are not considered material and in the absence of data have been excluded from the assessment.
Aviation	
GHGs arise from aircraft in the LTO phases for: - flights departing Gatwick: taxi-out; take-off roll; initial climb; climb-out (to 915 m[13]); and - flights landing at other airports from Gatwick-departing flights (from 915 m); landing roll; reverse thrust; taxi-in.	Future baseline emissions from aviation have not been linearly scaled. They are instead based on forecast future ATMs in the absence of the Project. Forecasting of future ATMs includes consideration of the aircraft in use for different routes with modelling of LTO and CCD emissions then based on these forecast flight/aircraft numbers. The future baseline (and the assessment of the Project) also incorporates aircraft efficiency improvements beyond 2038, uptake of SAF, and the introduction of zero emission aircraft in line with the UK Jet Zero Strategy High Ambition scenario.
GHGs arising from departing flights in CCD phase	
GHGs arising from aviation fuel use in APUs	The future baseline emissions from APU use were developed as part of the air quality assessment and reference should be made to the methodology in **ES Chapter 13: Air Quality** (Doc Ref. 5.1).
GHGs arising from aviation fuel use for Aircraft Engine Testing	The future baseline emissions from Aircraft Engine Testing use were developed as part of the air quality assessment and reference should be made to the methodology in **ES Chapter 13: Air Quality** (Doc Ref. 5.1).

Site-Specific Surveys

16.4.62 No site-specific surveys have been conducted for the GHG assessment.

[13] 3,000 ft

Assessment Criteria and Assignment of Significance

16.4.63 Guidance on assessing the impact and significance of GHG emissions is set out in two main documents:

- Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance 2nd Edition (Institute of Environmental Management and Assessment, 2022).
- Airports National Policy Statement: new runway capacity and infrastructure at airports in the Southeast of England (Department for Transport, 2018a) which is discussed previously in Paragraph 16.2.9.

16.4.64 The individual guidance documents do not provide a single consolidated approach to assessing impact and significance and there are differences between the tests and approach for assessing significance within each.

IEMA Guidance

16.4.65 The updated IEMA guidance, published in 2022, revised the overall approach to assessing the impacts and significance of GHG emissions from projects from the previous guidance (2017). The guidance directs that emissions must be contextualised as part of the assessment process (for example, but not exclusively, against national Carbon Budgets).

16.4.66 The revised guidance restates the principles that:

- GHG emissions from all projects will contribute to climate change, the largest interrelated cumulative environmental effect; and
- the consequences of a changing climate have the potential to lead to significant environmental effects on all topics in the EIA Directive (eg human health, biodiversity, water, land use, air quality).

16.4.67 The revised guidance provides a more nuanced approach to the appraisal of significance of changes in GHG emissions arising from a project than in previous guidance. It notes that some projects will lead to increases in emissions but that this alone does not represent a significant impact. Instead, it is the role of the suitable qualified expert carrying out the assessment to consider the scale of changes in emissions; the context within which these are expected to occur; the mitigation undertaken to minimise negative impacts; and the overall alignment of the project to achievement of the UK's carbon targets.

16.4.68 Guidance also directs that as GHG emissions from all projects contribute to global climate change, GHG impacts are not geographically limited meaning there is no local climate change effect that is greater than the impact of the project as a whole at a national scale. GHG emissions are not therefore assessed for local cumulative effects like other topics in this ES. A different approach is required due to the global nature of the receptor (the global atmosphere) – this different approach is one of contextualisation, whereby emissions can be considered relative to national budgets or industry/sector commitments.

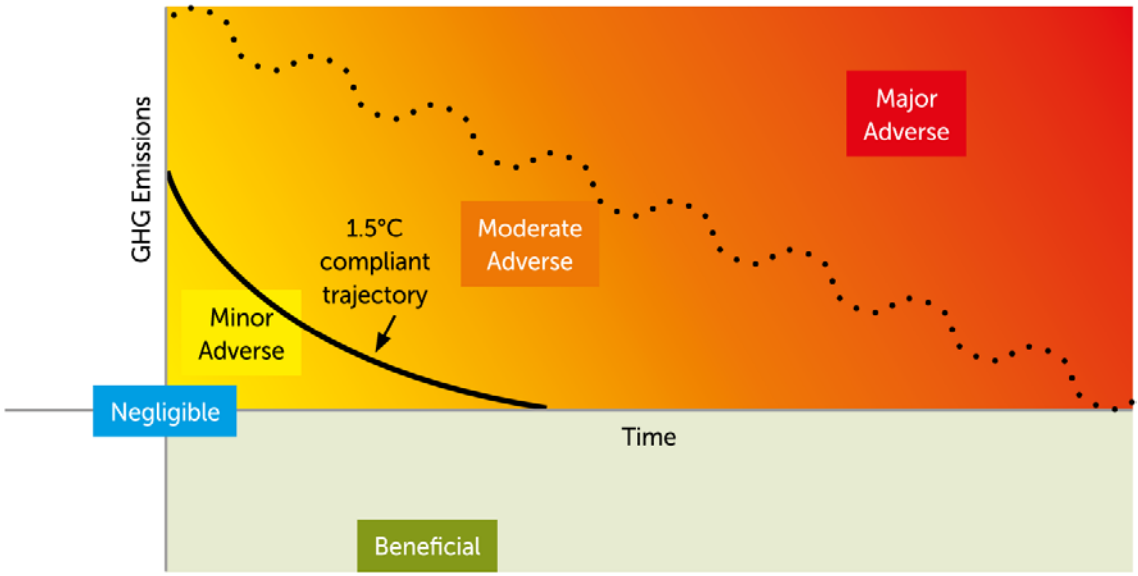
16.4.69 In order to assess significance the guidance states that several aspects must be considered:

- to what extent the project aligns, over time, with a trajectory to achieve net zero by 2050;
- to what extent the project aligns with current policy to progress towards net zero;

- consideration of the emissions from the project as a whole, rather than just consideration of net increases in emissions from a future baseline; and
- the extent to which the project developer has sought to mitigate emissions.

16.4.70 The IEMA guidance shows how to differentiate between levels of future emissions to support the appraisal of significance, by directing the assessment to consider progress compared to a 1.5°C compliant trajectory relevant to the project or emissions sources being assessed. This is presented conceptually in Diagram 16.4.1 which has been reproduced from the guidance document.

Diagram 16.4.1: Different Levels of Significance plotted against the UK's Net Zero Compatible Trajectory



Reproduced from Institute of Environmental Management and Assessment, 2022

16.4.71 The guidance directs that the assessment should contextualise project emissions in order to determine 'whether it supports or undermines a trajectory towards net zero' and that it is 'down to the practitioner's professional judgment on how best to contextualise a project's GHG impact'.

16.4.72 It further notes that the *starting* point for contextualisation should be consideration against national budgets (noting the limited applicability of this for small projects) and directs that assessment should consider further contextualisation against other appropriate trajectories where these exist at appropriate scale, including sector-based guidance, and policy goals (amongst others). The practitioner is directed to identify additional more specific quantitative contextualisation (where this exists) and also to use qualitative or policy-based approaches to contextualisation where necessary.

16.4.73 Significance is therefore expressed within the IEMA guidance as presented in Table 16.4.4.

Table 16.4.4: IEMA Guidance to Determine Level of Significance

Conclusion of Contextualisation	Appraisal of Significance	Level of Significance
Business-as-usual or do-minimum, incompatible with net zero trajectory for relevant contextualisation and results in residual emissions.	Significant	Moderate or Major adverse effect
Compatibility with science-based 1.5° trajectory, compliant with up-to-date policy, and reflecting 'good-practice' but which results in residual emissions.	Not significant	Minor adverse effect
Achieving emissions reductions substantially beyond trajectory, or existing and emerging policy, and that has minimal residual emissions.	Not significant	Negligible effect
Causes emissions to be avoided or removed from the atmosphere.	Significant	Beneficial effect

16.4.74 The guidance notes that projects that exceed an indicative threshold of 5% of national Carbon Budgets should adopt a modified approach to the above. As is demonstrated in later sections this threshold is not met by the Project.

16.4.75 The updated guidance explicitly notes that the assessment of significance does not reflect only the magnitude of emissions:

'The crux of significance therefore is not whether a project emits GHG emissions, nor even the magnitude of GHG emissions alone, but whether it contributes to reducing GHG emissions relative to a comparable baseline consistent with a trajectory towards net zero by 2050.'

16.4.76 IEMA guidance directs that mitigation can take the form of targets or commitments to actions at a later design stage and notes that the assessment must consider the certainty of these considering whether they are:

- evidenced in the design for the project;
- a committed goal that is secured, eg forming reflected in design; committed and secured, eg forming part of the description of development, a specific planning condition/requirement, or a legal agreement; and
- realistic and achievable to deliver.

16.4.77 The CAP and the SAC sets out commitments which are clearly stated goals, and which will be secured as part of the DCO process. As such these commitments are considered as mitigation within the assessment.

16.5 Assumptions and Limitations of the Assessment

16.5.1 Good practice for the quantification of GHG emissions requires the definition of a study period, which is typically chosen to reflect the service life of an infrastructure asset. This is particularly important as part of a lifecycle carbon management approach whereby impacts from pre-project, construction, operation, and decommissioning must all be considered in order to make informed decisions on design and delivery of a project.

16.5.2 This approach, however, is less directly relevant to an assessment of impacts - the purpose is not primarily to direct the project development, but instead to understand and assess impact. Given the policy context for the aviation sector, and other sectors relevant to this assessment, and considering the overarching timescales for achieving net zero by 2050, the study period extending to 2050 (the net zero year) has been adopted.

16.5.3 As the temporal scope of this assessment extends to 2050 this means that assumptions have been made for activities occurring over the period from baseline (2018) to 2050. These assumptions include emissions factors for the range of GHG emitting activities[14].

16.5.4 Most future emission factors will be dependent on factors outside of GAL's control, for example those affected through UK Government policy and legislation (as set out in Section 16.2). For example – the strength of the Jet Zero strategy (Department for Transport, 2022a) and commitments, which respond to the legal requirement for the UK to reach net zero in 2050, means that the Jet Zero targeted end point can be assumed to be met in 2050. Jet Zero itself identifies that the route to achieve this outcome cannot be fully described at this time (partly as it relies on the rate of development and introduction of future technologies) but that the UK Government is committed to enacting measures to ensure the outturn target is met. While there is certainty on the end point for aviation emissions in 2050 there are, inevitably, inherent uncertainties in the trajectory to reach that point. However, given that the net zero out-turn is committed to by Government, and that Government provides its informed view on how this might be met, it is reasonable to base the assessment on the proposed trajectory to net zero aviation in 2050 as set out in Jet ZeroIM:. The same approach is adopted with regards to the TDP to the extent that the assessment is based on the same assumptions contained therein about changes to surface transport and transport technologies required to achieve the policy position for 2050.

16.5.5 Table 16.5.1 sets out the main assumptions that have informed the development of the future scenario GHG estimates. Additional details on assumptions within the modelling process are set out in the appendices accompanying this ES chapter. The assumptions made are informed by and directly consistent with the Government's legally binding target to achieve net zero by 2050 and with the Strategies it has put in place to achieve that outcome.

[14] It should be noted that many of the emissions estimates are modelled and will differ from corporate reporting by GAL for years since 2018 and 2023. Modelling has not attempted to match corporate reporting targets although a review has confirmed that modelled and reported historic emissions are broadly comparable and the differences are not so great as to undermine the modelling approaches.

Table 16.5.1: Assumptions within the GHG Assessment

Assessment Issue	Assumptions
Future decarbonisation of the UK national grid	The grid is forecast to reduce in carbon intensity over the period of the Project, meaning that the GHG emissions from electricity use will reduce per kilowatt hour (kWh). The assessment has used UK Government forecasts for grid decarbonisation set out in the *Green Book supplementary guidance: valuation of energy use and greenhouse gas emissions for appraisal* (Department for Business, Energy & Industrial Strategy (2023)) to reflect electricity from the UK national grid and the emissions associated with this consumption under a location-based emissions reporting approach. This decarbonisation trajectory is set out in **ES Appendix 16.2.1: Summary of Local Planning Policy for Greenhouse Gases** (Doc Ref. 5.3).
Changes to the road vehicle fleet	The road vehicle fleet in the UK is projected to change in terms of the efficiency of vehicles, and also the shift from use of petrol/diesel vehicles to increasing numbers of electric vehicles. Modelling of emissions from surface access has been estimated using the forecast changes to the UK vehicle fleet, and the efficiency of vehicles, that have been used to support the TDP. The assumed changes in vehicle fleet make-up are presented in **ES Appendix 16.2.1: Summary of Local Planning Policy for Greenhouse Gases** (Doc Ref. 5.3).
Aviation emissions	The assumptions informing fuel use for aircraft in operation until 2038 are as set out in the air quality assessment in **ES Chapter 13: Air Quality** (Doc Ref. 5.1). The assessment includes a projection for emissions in the year 2050 based on modelled growth between 2039 and 2050. The assessment is cognisant of factors which will affect the efficiency of aircraft in future and assumes the efficiency improvements set out in the UK Government's Jet Zero Strategy (Department for Transport, 2022a) for the period 2039-2050 which assumes an annual improvement in efficiency of 2% per year. The assessment assumes the uptake of SAF to reflect the Jet Zero High Ambition scenario under which SAF usage is forecast to reach 10% by 2030, 22% by 2040, and 50% by 2050. The assessment also assumes that future periods see the introduction of zero emission aircraft to reflect the Jet Zero High Ambition scenario under which zero emission aircraft begin to be introduced in 2035, reaching 5% of ATMs by 2040, and 27% of ATMs by 2050.
Sustainable Aviation Fuels (SAF)	The assessment assumes the uptake of SAF to reflect the Jet Zero High Ambition scenario under which SAF usage is forecast to reach 10% by 2030, 22% by 2040, and 50% by 2050.
Zero emission flight technology	The assessment assumes that future periods see the introduction of zero emission aircraft to reflect the Jet Zero High Ambition scenario under which zero emission aircraft begin to be introduced in 2035, reaching 5% of ATMs by 2040, and 27% of ATMs by 2050.
Construction materials	In the absence of detailed design quantities for construction projects (which will be developed at later design stages) the assessment relies on estimated material quantities

Assessment Issue	Assumptions
	for airside works, but also on typical material emissions per m^2 of floor area of buildings. Further details on these assumptions are set out in **ES Appendix 16.9.1: Assessment of Construction Greenhouse Gas Emissions** (Doc Ref. 5.3). As the UK progresses towards climate change targets for 2050 it is expected that emissions from the manufacture of products will reduce as the wider economy decarbonises. However for the purposes of this ES no allowance has been included for these exogenous effects in the modelling of construction emissions. This is considered a conservative approach to estimating embodied carbon emissions for construction.
Construction material and waste transportation	Construction waste arises from two main sources: the demolition or removal of existing structures/surfaces earthworks; and material wastage from construction activities. For this ES the estimates of demolition/removal of existing structures/surface assumes recycling and reuse that aligns with **ES Appendix 5.3.1: Buildability Report – Part A** (Doc Ref. 5.3) and **ES Appendix 5.3.1: Buildability Report – Part B** (Doc Ref. 5.3). Material wastage is estimated as an additional percentage tonnage overhead on the construction materials. Further details on these assumptions are set out in **ES Appendix 16.9.1: Assessment of Construction Greenhouse Gas Emissions** (Doc Ref. 5.3)
Construction processes	Construction process emissions arise from the operation of plant and equipment on site. This ranges from large scale plant (eg batching plant for concrete) to operation of individual pieces of mobile machinery. Emissions arise from the energy use which can be powered by a range of sources including grid electricity, local electricity generation, or direct fuel use. Construction emissions have been estimated based on staff numbers for plant operatives, assuming a set number of operating hours per operator and using benchmark energy consumption for a set of indicative plant equipment. For this ES no assumptions have been made within the main assessment regarding changes to the carbon intensity of electrical power where this is used in construction plant. This is considered a conservative approach to estimating embodied carbon emissions for construction.
ABAGO	ABAGO incorporates several emissions activities including operational energy use, refrigerant losses, and water/wastewater/waste emissions. Further details on other emissions activities assumptions are set out in **ES Appendix 16.9.2: Assessment of Greenhouse Gas Emissions for Airport Buildings and Ground Operations (ABAGO)** (Doc Ref. 5.3).
Surface access for passengers	At the stage when the PEIR was developed there was insufficient information from strategic modelling of surface access to allow quantification of GHG emissions based on modelled transport patterns. At that stage an estimation of emissions was made based on available travel survey data for passengers. Since this point strategic modelling has been completed and provides modelled estimates of passenger transport choices, and the vehicle modes used for these trips. The strategic modelling outputs reflect the committed outcomes set out in **ES Appendix 5.4.1: Surface Access Commitments** (Doc Ref. 5.3). Further details on these

Assessment Issue	Assumptions
	assumptions are set out in **ES Appendix 16.9.3: Assessment of Surface Access Greenhouse Gas Emissions** (Doc Ref. 5.3).
Surface access for airport staff/workers	At the stage when the PEIR was developed there was insufficient information from strategic modelling of surface access to allow quantification of GHG emissions based on modelled transport patterns. At that stage an estimation of emissions was made based on available survey data for staff. Since this point strategic modelling has been completed and provides modelled estimates of staff transport choices, and the vehicle modes used for these trips. The strategic modelling outputs reflect the committed outcomes set out in **ES Appendix 5.4.1: Surface Access Commitments** (Doc Ref. 5.3). Further details on these assumptions are set out in **ES Appendix 16.9.3: Assessment of Surface Access Greenhouse Gas Emissions** (Doc Ref. 5.3).
Freight transport	Detailed data are unavailable at present on freight transport which comprises several categories of vehicle transport: ▪ cargo/mail freight; ▪ airport service freight; ▪ freight supporting retail activities; and ▪ airline serving freight; Forecasts for the Project provide estimates of cargo/mail freight and the assessment seeks to estimate emissions arising from these services by assuming a typical transport distance by road to/from the airport, and by assuming these trips are made by a Heavy Goods Vehicle (HGV). Further details on other emissions activities assumptions are set out in **ES Appendix 16.9.3: Assessment of Surface Access Greenhouse Gas Emissions** (Doc Ref. 5.3). Retail freights are not considered material to the assessment of GHG emissions and are not included in the assessment modelling. The materiality exercise is presented within **ES Appendix 16.9.3: Assessment of Surface Access Greenhouse Gas Emissions** (Doc Ref. 5.3).

16.6 Baseline Environment

Current Baseline Conditions

16.6.1 The baseline refers to Gatwick's GHG emissions in the calendar year 2018. It draws together information from a range of documents, analysis and sources. A full breakdown of emissions is included in each of the appendices accompanying this ES chapter. These are summarised in Table 16.6.1.

Table 16.6.1: 2018 Baseline GHG Emissions for Construction, ABAGO, Surface Access and Aviation

Emissions Activity	2018 GHG Emissions ($MtCO_2e$)
Construction	
Construction	Baseline construction emissions for 2018 are considered to be zero for the purposes of the assessment.
Land use change	Land use change emissions for the baseline year are assumed to be zero.
ABAGO	
Energy use	0.056
Vehicle fuel use	0.008
Water, wastewater, and waste management	0.001
Refrigerant emissions	0.001
Fire training	<0.001
Surface access	
Passengers	0.332
Staff	0.031
Commercial Freight	0.006
Aviation and aircraft fuel	
Domestic flights	0.115
International flights	4.618
Other aviation fuel use	0.023
TOTALS[15]	
Total excluding international air transport	0.571[16]
Total including international air transport	5.190

Future Baseline Conditions

16.6.2 Future baseline emissions have been developed across each of the four emissions categories for all years between 2018 and 2050 to inform the assessment process. The approach for calculating emissions differs for each emissions category and relies on different input data. The methodology for each is set out above in Section 16.4, and additional detail and data for each is provided in detail in Appendices 16.9.1 to 16.9.4 (Doc Ref. 5.3).

16.6.3 Future baseline emissions for 2029, 2038, 2047, and 2050 are set out in Table 16.6.2. These reflect the opening year of the altered northern runway (2029), design year (2038), future year (2047), and the net zero year (2050) considered in the 'with-Project' assessment.

16.6.4 The full future baselines for each emissions category are set out in Appendices 16.9.1 to 16.9.4 (Doc Ref. 5.3).

[15] Total emissions are presented excluding and including international aviation as this is not included within UK Carbon Budgets prior to the Sixth Carbon Budget.
[16] Throughout this chapter, and associated appendices, tables present the calculated values for that datum. These are frequently simplified to a specific number of decimal places or significant figures. In several cases disparities in rounding lead to tallies of summary values, and presented total values, being inconsistent.

Construction Future Baseline

16.6.5 Future baseline emissions for construction include a range of already consented construction projects as set out in the **ES Chapter 5: Project Description** (Doc Ref. 5.1) due to take place between 2023 and 2026. The future baseline emissions estimates do not include for any commitments around emissions targets reductions for existing planned development.

ABAGO Future Baseline

16.6.6 Future baseline emissions for ABAGO reflect estimated future energy consumption reflecting already-consented growth at Gatwick, increasing use of renewable energy supplies, and reflecting decarbonisation of the electricity grid.

16.6.7 The future baseline also reflects GAL's commitments to be a net zero airport (for Scope 1 and 2) by 2030, and a zero emission airport (for Scope 1 and 2) by 2040 in line with Decade of Change commitments and the Jet Zero Strategy (Department for Transport, 2022a) targets for 2040. GAL's commitment to deliver these outcomes are not dependent on the success of the Project's DCO Application and are accordingly reflected in the future baseline assessment (and which avoids overstating the emissions reduction as part of the Project); however, the CAP is proposed to be secured under the DCO to provide an additional level of assurance to stakeholders.

16.6.8 The future baseline considers where GAL will seek to develop direct use of renewable energy from sources largely under their control, including on-site renewable energy sources, private-wire renewables supplies, or supply arranged through a Power Purchase Agreement (PPA). Energy drawn from these supplies, in future years, are considered to have zero GHG emissions.

16.6.9 In the future baseline GAL will still reply on some use of electricity drawn from the UK national grid. Modelling of emissions for grid-supplied electricity consumption adopts a grid-average electricity carbon emissions factor. In future years this carbon emissions factor takes account of the decarbonisation of the UK electricity grid that is projected to bring electricity emissions per kWh to near-zero by 2050.

Surface Access Future Baseline

16.6.10 Future baseline emissions for surface access reflect the fleet and efficiency assumptions that align with the TDP and incorporate the measures set out in the Airport Surface Access Strategy (ASAS) (Gatwick Airport Ltd, 2022).

Aviation Future Baseline

16.6.11 The future baseline aircraft movements are forecast to increase out to 2047, increasing to approximately 326,000 ATMs. The projected emissions from aircraft for the future baseline consider the forecast flight destinations and aircraft types. They also reflect changes in the expected aircraft fleet in the period to 2038. The modelling assumes aircraft efficiency improvements beyond 2038, SAF uptake rate, and the introduction of zero emission aircraft rate that align with the High Ambition scenario contained in the Jet Zero Strategy (Department for Transport, 2022a)[17].

[17] This assumes an average annual efficiency improvement across aircraft of 2% per year. This has been modelled for the period 2038-2050. SAF uptake is modelled as being 10% by 2030, 22% by 2040, and 50% by 2050. Further information on modelling assumptions is provided in **ES Appendix 16.9.4: Aviation Greenhouse Gas Emissions** (Doc Ref. 5.3).

Table 16.6.2: Future Annual Baseline GHG Emissions for Construction, ABAGO, Surface Access and Aviation (Opening/Design/Future/Net zero years)

Emissions Activity	Baseline GHG Emissions ($MtCO_2e$)	GHG Emissions ($MtCO_2e$)	Design Year Emissions ($MtCO_2e$)	Future Year Emissions ($MtCO_2e$)	Net Zero Year ($MtCO_2e$)
	2018	2029	2038	2047	2050
Construction					
Construction	Zero	No construction is scheduled for the future baseline years 2029, 2038 and 2050.			
Land use change	Zero	Land use change has not been evaluated for individual years. For further detail see **ES Appendix 16.9.1: Assessment of Construction Greenhouse Gas Emissions** (Doc Ref. 5.3) for the approach to land use change.			
ABAGO[18]					
Energy use	0.056	0.002	-	-	-
Vehicle fuel use	0.008	<0.001	<0.001	<0.001	<0.001
Water, wastewater, and waste management	0.001	<0.001	<0.001	<0.001	<0.001
Refrigerant emissions	0.001	<0.001	<0.001	<0.001	<0.001
Fire training	<0.001	<0.001	<0.001	<0.001	<0.001
Surface access					
Passengers	0.332	0.237	0.097	0.025	0.012
Staff	0.031	0.022	0.007	0.002	0.001
Commercial Freight	0.006	0.007	0.004	0.003	0.001
Aviation					
Domestic flights	0.115	0.094	0.072	0.035	0.031
International flights	4.618	5.089	4.454	3.234	2.920
Other aviation fuel use	0.023	0.023	0.019	0.014	0.013

[18] ABAGO emissions represent an indicative forecast scenario reflecting the emissions under the CAP and based on the indicative energy scenario presented in **ES Appendix 16.9.2: Assessment of Greenhouse Gas Emissions for Airport Buildings and Ground Operations (ABAGO)** (Doc Ref. 5.3).

Emissions Activity	Baseline GHG Emissions ($MtCO_2e$)	GHG Emissions ($MtCO_2e$)	Design Year Emissions ($MtCO_2e$)	Future Year Emissions ($MtCO_2e$)	Net Zero Year ($MtCO_2e$)
	2018	2029	2038	2047	2050
TOTALS					
Total excluding international air transport	0.571	0.388	0.200	0.080	0.057
Total including international air transport	5.190	5.477	4.654	3.313	2.997

16.7 Key Aspects of the Project

16.7.1 The assessment has been based on the description of the Project and the forecasts set out in **ES Chapter 5: Project Description** (Doc Ref. 5.1).

16.7.2 Table 16.7.1 below identifies the maximum design scenarios relevant to this assessment. Where options exist, the maximum design scenario selected is the one having the potential to result in the greatest effect on emissions. Greater effects 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.

16.7.3 The impact being assessed is the emission of GHGs arising from the construction of the Project, ABAGO from the airport in future years, and emissions associated with surface access and aviation. The impact (ie the emissions) arise from a consistent set of sources, albeit the emissions from each source would vary during the period between 2018 and 2050.

Table 16.7.1: Maximum Design Scenarios

Emissions Activity	Maximum Design
Construction	Construction of all components of the Project set out in **ES Chapter 5: Project Description** (Doc Ref. 5.1) delivered in line with the indicative phasing.
ABAGO	Energy use to support 80.2 million passengers per annum (mppa) by 2047. Increased water, wastewater, and waste generation and management to support 80.2 mppa by 2047.
Surface access	Surface access for maximum 80.2 mppa by 2047. Staff access for maximum 32,800 staff by 2047.
Aviation	Forecast 386,000 total aircraft movements per annum by 2047.

16.8 Mitigation Measures Adopted as Part of the Project

16.8.1 As part of the Project GAL has committed to achieving a range of outcomes that would help to mitigate the impact of construction, surface access, and ABAGO. Performance against these outcome measures forms part of the DCO Application.

16.8.2 **ES Appendix 5.4.2: Carbon Action Plan** (Doc Ref. 5.3) provides commitments across three of the GHG assessment topics: construction; surface access; and aviation. Within the CAP quantitative commitments are made as follows:

- GAL commits to a construction carbon budget of 1.15 $MtCO_2e$ for airfield, buildings, and highways construction. This represents a 17% reduction on the modelled construction emissions based on typical industry construction practices.
- GAL commits to achieving net zero for Scope 1 and 2 emissions by 2030, and zero emissions for Scope 1 and 2 by 2040.

16.8.3 **ES Appendix 5.4.1: Surface Access Commitments** (Doc Ref. 5.3) provides commitments to achieving specific levels of lower emission transport modes for passengers and staff accessing the airport. The SAC includes commitments to:

- achieve specific sustainable transport shares;
- implement measures and interventions which GAL would use to achieve the mode share commitments; and
- the approach to monitoring and reporting surface access information to identify whether the mode share commitments are being achieved.

16.8.4 In addition to the SACs, GAL is also including within the Project a range of highways improvements to support access to the airport, within the context of the wider commitments set out above.

16.8.5 For the purposes of the assessment the commitments within the CAP and the SAC inform the activity levels and GHG emissions used in the assessment.

16.8.6 The scale of mitigation, compared to typical practice in the absence of the commitments, is presented in ES Appendix 16.9.1: Assessment of Construction Greenhouse Gas Emissions (Doc Ref. 5.3), ES Appendix 16.9.2: Assessment of Greenhouse Gas Emissions for Airport Buildings and Ground Operations (ABAGO) (Doc Ref. 5.3), and ES Appendix 16.9.3: Assessment of Surface Access Greenhouse Gas Emissions (Doc Ref. 5.3).

16.8.7 Further information on the methods and proposed actions to deliver on the commitments is set out in **ES Appendix 5.4.2: Carbon Action Plan** (Doc Ref. 5.3) and **ES Appendix 5.4.1: Surface Access Commitments** (Doc Ref. 5.3).

16.9 Assessment of Effects

16.9.1 The assessment of effects from the Project are presented under each of the four emissions areas – construction, ABAGO, surface access and aviation.

16.9.2 In line with IEMA guidance (Institute of Environmental Management and Assessment, 2022) the evaluation of significance considers several aspects:

- the scale of emissions resulting from the Project, after embedded mitigation, and how these add to future baseline emissions (those occurring in the absence of the Project); and
- the extent to which future annual emissions levels reduce over time, contextualisation of the extent to which these support wider efforts to reach net zero, and whether emissions trajectories render emissions as significant.

16.9.3 As part of the contextualisation required under the IEMA guidance, the assessment of each emissions area compares the overall magnitude of emissions (both net change and absolute emissions from the airport) for future assessment years and contextualises these against the UK Carbon Budgets (for those periods for which Budgets currently exist).

16.9.4 The assessment also considers how each area increases/reduces GHG emissions relative to a comparable baseline consistent with a trajectory toward net zero by 2050.

- Construction emissions are not contextualised against a future trajectory time series as they take place at the start of the Project and do not have significant long-term emissions levels beyond the completion of construction processes.
- ABAGO emissions are contextualised against the CCC Balanced Pathway trajectory for non-domestic buildings.
- Surface access emissions are contextualised against the CCC Balanced Pathway trajectory for UK surface access.
- Aviation emissions are contextualised against the UK Jet Zero trajectory for national emissions from aviation.

Construction

Impacts Arising from Construction of Facilities

16.9.5 Construction of the airport facilities, and changes to the supporting highway network, would result in the generation of GHG emissions. These impacts would include the production of GHGs arising from:

- the extraction, processing and manufacturing of construction materials;
- transportation of construction materials;
- energy and fuel use in construction activities;
- transport and disposal of construction waste; and
- surface access by construction staff.

16.9.6 The assessment has also considered land use change impacts that would lead to the release of stored carbon, and the future sequestration of carbon in newly created habitats.

16.9.7 GAL has undertaken a quantification exercise to forecast GHG emissions associated with airfield works, new buildings, and construction of new highways to facilitate the Project under typical construction practices. This quantification has been used to support the development of, and commitment to, a carbon budget for construction of the Project that represents a meaningful, yet feasible, reduction in construction stage emissions. This quantification is presented in **ES Appendix 16.9.1: Assessment of Construction Greenhouse Gas Emissions** (Doc Ref. 5.3).

16.9.8 GAL has identified a construction GHG budget that is 17% lower than an unmitigated construction approach and within **ES Appendix 5.4.2: Carbon Action Plan** (Doc Ref. 5.3) commits to delivering construction of the Project within this budget amount.

- In the absence of the CAP, estimated construction emissions for the Project would be 1.391 $MtCO_2e$.
- GAL commits (via the CAP) to deliver construction of the Project within a GHG budget of 1.155 $MtCO_2e$ – representing a 17% reduction on the unmitigated construction approach.

16.9.9 Table 16.9.1 shows emissions from planned construction that will be undertaken regardless of the Project; the total emissions arising from the works brought forward as part of the Project; and the aggregated total of both over the period 2023-2038[19]. The Project construction is projected to finish in 2038.

Table 16.9.1: Construction Emissions Without and With the Project

Emissions Activity	Future Baseline Construction Emissions ($MtCO_2e$)	Project Construction Emissions ($MtCO_2e$)
TOTAL	**0.045**	**1.155**

16.9.10 The aggregated estimated emissions from construction of the Project between 2024 and 2038 would be 1.155 $MtCO_2e$.

16.9.11 Prior planned construction in the period 2023 to 2026 – representing the future baseline – totals 0.045 $MtCO_2e$.

16.9.12 The modelling of construction emissions adopts a conservative approach in that it does not seek to account for any further exogenous decarbonisation trends within the wider manufacturing of construction materials.

16.9.13 Construction emissions differ from other (operational) emissions in that they would occur in the period 2024 to 2035 and do not have an ongoing emissions value (from the perspective of the scope of this assessment) beyond this date.

16.9.14 Estimated construction emissions are derived from the business-as-usual modelling of construction impacts which generates a time series for construction emissions. To represent the mitigated construction emissions under the CAP a mitigated construction value for each year has been derived by reducing business-as-usual emissions by 17% and applying this reduction to each of the emissions sources on a pro-rata basis.

16.9.15 Estimated construction emissions for the assessment years, allowing for committed CAP mitigation, are presented in Table 16.9.2. As construction is due to be completed by 2038 emissions in this and subsequent assessment years are zero.

[19] Note that while the construction programme for the Project is 2024-38, the future baseline includes some construction in 2023.

Table 16.9.2: Future Construction Emissions with the Project (Opening/Design/Future/Net Zero Years)

Emissions Totals	Baseline Year GHG Emissions ($MtCO_2e$)	Opening Year GHG Emissions ($MtCO_2$)	Design Year GHG Emissions ($MtCO_2$)	Future Year GHG Emissions ($MtCO_2e$)	Net Zero Year ($MtCO_2e$)
	2018	**2029**	**2038**	**2047**	**2050**
With Project					
Construction materials	-	0.058	-	-	-
Construction waste	-	0.001	-	-	-
Construction plant	-	0.028	-	-	-
Transport – materials and waste	-	0.006	-	-	-
Transport – construction workers	-	0.002	-	-	-
Water	-	0.000	-	-	-
Total	-	**0.095**	-	-	-

Impacts Arising from Land Use Change

16.9.16 The appraisal of land use impacts is based on a common dataset as used for the calculation of biodiversity net gain for the Project. This appraisal provides an estimate of the hectarage of different habitat types before and after construction of the Project for the areas impacted by the Project.

16.9.17 In the absence of the Project, land use impacts are assumed to be zero on the basis that existing habitats are mature and any ongoing sequestration is at a low annual rate.

16.9.18 Due to the nature of the construction programme it is likely that much of the landscape areas present before construction would be removed, and new habitat areas provided in different locations. To estimate the GHG impacts of this process a worst-case assumption is adopted that assumes all habitat areas are lost during construction, and then sequestration of carbon in newly constructed habitat areas would develop over time as the habitat matures.

16.9.19 This represents a conservative approach to the appraisal of land use changes impacts as it assumed 100% loss of all habitat areas during construction processes whereas it is likely that some areas would remain undisturbed or minimally disturbed during construction.

16.9.20 The appraisal uses average carbon stock data for each of the habitat types, representing a mature habitat over 30 years of age, to estimate the maximum loss and subsequent gain of sequestered carbon. The scale of lost and sequestered carbon is presented in Table 16.9.3.

Table 16.9.3: Carbon Losses and Gains through Landscape Use Changes

Impact	100% Loss During Construction	Post-Construction Sequestration (assumed 30-year maturity)
Carbon (tonnes C)	22,267	21,217
Carbon dioxide equivalent (tCO_2e)	81,645	77,794

16.9.21 The net change is estimated as an emission of 3,851 tCO_2e.

16.9.22 The scale of land use emissions for the area impacted by the Project is small compared to wider construction. While the comparison of habitat areas does indicate a net release of GHG emissions over the construction period and the 30 years following, the new areas of habitat would be expected to continue to sequester carbon beyond this period (albeit at a slower rate per year).

16.9.23 Given the losses and gains from land use are estimated to change by less than 1% these are not considered further within the GHG assessment.

Contextualising the Emissions

16.9.24 Due to the nature of construction impacts they are challenging to contextualise against on a temporal trajectory basis as they do not reflect ongoing emissions profiles throughout operation[20] and a time-basis trajectory out to 2050 is not applicable.

16.9.25 In line with IEMA guidance (Institute of Environmental Management and Assessment, 2022) the contextualisation of construction emissions has been carried out based on comparing future emissions with the UK Carbon Budgets for those periods where budgets currently exist. Emissions have been calculated for each of the five-year budget periods and the absolute emissions, as well as the net change attributable to the Project, are presented against the Carbon Budgets in Table 16.9.4.

[20] Land use would result in carbon sequestration during the operational phase but this is largely a function of landscape creation rather than ongoing maintenance strategy, although it should be noted that the rate and retention of carbon in landscapes can be optimised through effective landscape management.

Table 16.9.4: Comparison of Construction Emissions to UK Carbon Budgets

Carbon Budget	Period	Five-Year Carbon Budget ($MtCO_2e$)	Future Baseline Construction Emissions for the Five-Year Budget Period ($MtCO_2e$)	Future With-Project Construction Emissions for the Five-Year Period ($MtCO_2e$)	Net Increase between With-Project and Baseline Construction Emissions ($MtCO_2e$)	Contribution to Carbon Budget of Total Future Airport Construction Emissions (%)	Contribution to Carbon Budget of Net Future With-Project Construction Emissions (%)
Third Carbon Budget	2018 – 2022	2,544	-	-	-	-	-
Fourth Carbon Budget	2023 – 2027	1,950	0.045	0.565	0.520	0.029%	0.027%
Fifth Carbon Budget	2028 – 2032	1,725	-	0.481	0.481	0.028%	0.028%
Sixth Carbon Budget	2033 – 2037	965	-	0.154	0.154	0.016%	0.016%

16.9.26 In all periods the construction emissions from the Project are higher than those in the future baseline.

16.9.27 The comparison of construction emissions to the Carbon Budgets indicate that they are small for all periods, not exceeding 0.1% of the total emissions for the budget period in any individual five-year period. The net change arising from the Project is the same in the Fifth and Sixth Carbon Budget periods as there are zero construction emissions in the baseline scenario.

16.9.28 On the basis that construction and land use emissions result in an increase from the baseline it is reasonable to conclude that they result in an adverse effect. The emissions from the construction phase are small when considered in the context of national Carbon Budgets. The assessed construction emissions also reflect the commitments set out in the CAP which deliver a significant reduction in emissions from typical construction practices.

16.9.29 On the basis of scale, and reflecting the commitments made by GAL to mitigate construction emissions, it is concluded that construction impacts result in a **Minor Adverse Not Significant Effect**.

Airport Buildings and Ground Operations

16.9.30 The Project ABAGO emissions reflect the changes that are expected to arise from energy use across the airport with the Project. The Project emissions reflect several different emissions sources at the airport:

- energy use in GAL owned and operated buildings (electricity and natural gas);
- energy use by third parties in their buildings/spaces located within the airport (electricity and natural gas);
- fuels and electricity used by GAL and by third parties to operate vehicles and plant within the airport;
- emissions associated with water supply, wastewater treatment, and waste management by GAL and third parties located within the airport;
- use of fuels and materials for fire training within the airport; and
- refrigerant losses from building energy and cooling systems within the airport.

16.9.31 GAL is committed to reducing the impacts associated with operations at the airport, including those over which it has full control, and those where it exercises influence but not full control. GAL has previously set out a range of commitments within its Decade of Change (Gatwick Airport Ltd, 2021) that include reducing GHG impacts from its operations.

16.9.32 GAL has developed a CAP which further develops commitments on GHG emissions from ABAGO. The CAP includes:

- a commitment to reach net zero by 2030 for Scope 1 and 2 emissions;
- a commitment to reach zero emissions by 2040 for Scope 1 and 2 emissions; and
- a commitment to support the reduction of Scope 3 emissions for other operations within the airport boundary.

16.9.33 The CAP is not prescriptive on the specific measures that will be adopted to achieve the ABAGO targets. This is due to uncertainty in the technical understanding of how individual energy projects and plant replacement will be brought forward within the airport, and the degree to which different technologies will be deployed.

16.9.34 However, GAL is committing to specific performance outcomes on Scope 1 and 2 for the target dates of 2030 and 2040 and it is appropriate to consider this as part of the embedded mitigation for the Project[21]. In order to inform the assessment of impacts GAL has developed a future scenario that delivers the commitments within the CAP. The assumptions within this future scenario are set out in **ES Appendix 16.9.2: Assessment of Greenhouse Gas Emissions for Airport Buildings and Ground Operations (ABAGO)** (Doc Ref. 5.3).

16.9.35 Modelling of ABAGO emissions considers where GAL will seek to develop direct use of renewable energy from sources largely under their control, including on-site renewable energy sources, private-wire renewables supplies, or supply arranged through a Power Purchase Agreement (PPA). Energy drawn from these supplies, in future years, are considered to have zero GHG emissions.

16.9.36 In future years GAL will still reply on some use of electricity drawn from the UK national grid. Modelling of emissions for grid-supplied electricity consumption adopts a grid-average electricity carbon emissions factor. In future years this carbon emissions factor takes account of the decarbonisation of the UK electricity grid that is projected to bring electricity emissions per kWh to near-zero by 2050.

16.9.37 Table 16.9.5 presents ABAGO emissions for the baseline and assessment years.

Table 16.9.5: Future ABAGO Emissions for the Project (Opening/Design/Future/Net Zero Years)[22]

Emissions Totals	Baseline Year GHG Emissions ($MtCO_2e$)	Opening Year GHG Emissions ($MtCO_2e$)	Design Year GHG Emissions ($MtCO_2e$)	Future Year GHG Emissions ($MtCO_2e$)	Net Zero Year ($MtCO_2e$)
	2018	**2029**	**2038**	**2047**	**2050**
With Project					
Energy use in buildings	0.056	0.002	-	-	-
Energy use for vehicles	0.008	0.001	<0.001	<0.001	<0.001
Water consumption, wastewater, and waste	0.001	0.001	0.001	0.001	0.001
Fire training	0.000	<0.001	<0.001	<0.001	<0.001
Refrigerant losses	0.001	0.001	<0.001	<0.001	<0.001
Total	**0.065**	**0.005**	**0.001**	**0.001**	**0.001**

[21] Commitments on Scope 1 and 2 will be present in both the without-Project and with-Project scenarios and as such the commitment features in both the future without-Project assessment of emissions, and the future with-Project assessment of emissions.
[22] Further detail on the emission factor for residual grid electricity in future years is presented in **ES Appendix 16.9.2: Assessment of Greenhouse Gas Emissions for Airport Buildings and Ground Operations (ABAGO)** (Doc Ref. 5.3).

Contextualising the Emissions

16.9.38 In line with IEMA guidance (Institute of Environmental Management and Assessment, 2022) the starting point for assessment of effects is to compare the future emissions with the UK Carbon Budgets for those periods where budgets currently exist. Emissions have been calculated for each of the five-year budget periods and the absolute emissions, as well as the net change attributable to the Project, are presented against the total UK Carbon Budgets in Table 16.9.6.

Table 16.9.6: Comparison of ABAGO Emissions to UK Carbon Budgets

Carbon Budget	Period	Five-Year Carbon Budget ($MtCO_2e$)	Future Baseline ABAGO Emissions for Five-Year Budget Period ($MtCO_2e$)	Future With-Project ABAGO Emissions for Five-Year Period ($MtCO_2e$)	Net Increase between With-Project and Baseline ABAGO ($MtCO_2e$)	Contribution to Carbon Budget of Total Future Airport ABAGO Emissions (%)	Contribution to Carbon Budget of Net Future With-Project ABAGO Emissions (%)
Third Carbon Budget	2018 – 2022	2,544	0.238	0.238	<0.001	0.009%	-
Fourth Carbon Budget	2023 – 2027	1,950	0.164	0.164	<0.001	0.008%	-
Fifth Carbon Budget	2028 – 2032	1,725	0.024	0.026	0.002	0.002%	<0.001%
Sixth Carbon Budget	2033 – 2037	965	0.008	0.011	0.002	0.001%	<0.001%

16.9.39 The comparison of ABAGO emissions to the Carbon Budgets indicate that they are very small for all periods, not exceeding 0.01% of the total emissions for the budget period in any individual five-year period. The comparison of net emissions changes arising from the Project are smaller again.

16.9.40 IEMA additionally recommends further contextualisation of emissions to support the appraisal of significance. ABAGO emissions differ from other topics (aviation and surface access) in that GAL has full control over the energy use and emissions associated with areas under its operational control. GAL also has a degree of influence over third party operations within the airport albeit this does not extend to day-to-day operational control.

16.9.41 Due to the complexity of the ABAGO topic a single data source cannot be used to adequately contextualise the future emissions trajectory – as it incorporates building energy, as well as emissions for vehicles, fire testing, and refrigerant emissions.

16.9.42 The contextualisation of emissions has therefore drawn on a building-energy specific trajectory only to provide further guidance on the appraisal of significance. A range of future trajectories has been developed at national scale for the built environment but the source used for contextualisation below is taken from the Sixth Carbon Budget (Committee on Climate Change, 2022), that provides a future net zero trajectory for non-residential buildings. Contextualisation is presented below reflecting ABAGO building energy only (which represents approximately 85% of ABAGO emissions in early years, dropping to around 65% in 2050).

16.9.43 As with other topics a side-by-side comparison of the trajectories is of limited use as the overall scale of non-residential building emissions (nationally) is approximately 300 times the scale of the modelled building energy emissions for the Project. But it does seek to represent the rate at which GAL expects to reduce building energy emissions (and wider ABAGO emissions) compares this to the rate of reduction required nationally. Delivering a rate of emissions reduction that aligns with a required sectoral decarbonisation rate is a key consideration under the IEMA guidance.

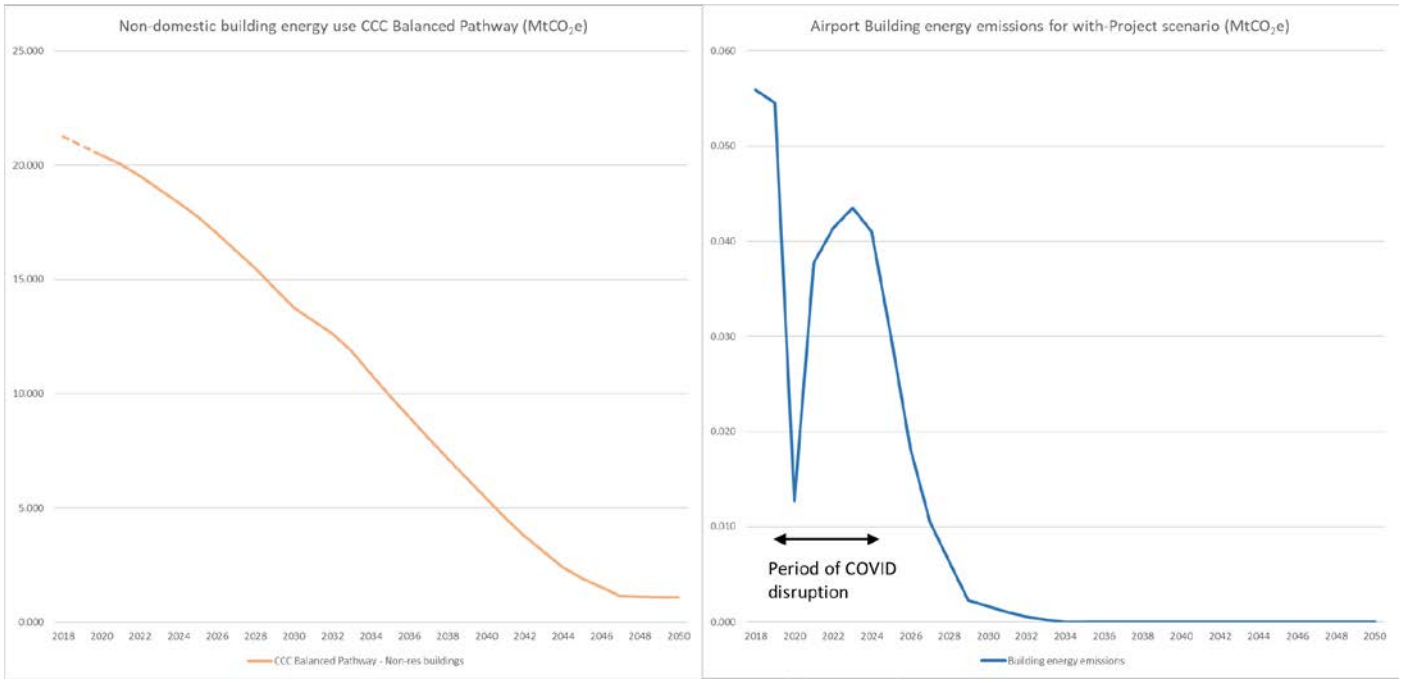
16.9.44 The contextualisation exercise does require careful consideration for several reasons:

- it provides estimated emissions for the whole airport with the Project, rather than just net-increase in emissions from the Project;
- national projections of emissions from non-residential buildings by definition represents an extremely wide range of different building types, sizes and uses. There is no specific reason to expect that an airport will necessarily align with an averaged decarbonisation rate for the wider non-residential building stock in the UK, however it does provide an illustrative rate of decarbonisation required on average across the UK.

16.9.45 Diagram 16.9.1 presents a comparison of ABAGO building energy emissions under the following scenarios:

- The trajectory for decarbonisation of non-residential buildings taken from the CCC Balanced Net Zero Pathway.
- The with-Project scenario building energy emissions for the Airport.

Diagram 16.9.1: Comparison of with-Project ABAGO Building Energy Emissions for the Airport with CCC Balanced Pathway Trajectory



16.9.46 Table 16.9.6 shows that ABAGO emissions increase from the baseline position under the with-Project scenario. Diagram 16.9.1 shows that under the CAP emissions at a more rapid rate than the net zero trajectory for the UK. Additionally, the trajectory presented is for the full with-Project GHG emissions rather than solely the net gains arising from the Project. On this basis it is concluded that ABAGO results in a **Minor Adverse Not Significant Effect.**

Surface Access

16.9.47 The projected emissions for surface access accessing the airport reflect three main grouped emissions sources:

- the strategic transport model forecasts of passenger transport to/from the airport;
- the strategic transport model forecasts of airport staff transport to/from the airport; and
- ground surface access provided for commercial freight services[23].

16.9.48 Information on the strategic transport modelling carried out to support the application process can be found in **ES Chapter 12: Traffic and Transport** (Doc Ref. 5.1). This provides a full explanation of the modelling approach adopted for transport modelling. The GHG assessment has used the strategic transport model in order to achieve consistency with other environmental topics such as noise and air quality.

16.9.49 The strategic transport model considers passenger and staff transport to and from the airport via road and rail transport modes. Gatwick currently has an Airport Surface Access Strategy (Gatwick

[23] A materiality assessment was carried out to consider the inclusion of transport associated with retail freight (ie freight associated with goods transported to the airport for sale via retail outlets and catering). The materiality assessment concluded that emissions from this source are unlikely to make a material contribution to the assessment of GHG impacts. As Gatwick does not currently collect this data from retail providers across the airport it has been excluded from the assessment. The materiality assessment is presented in **ES Appendix 16.9.3: Assessment of Surface Access Greenhouse Gas Emissions** (Doc Ref. 5.3).

Airport, 2022) that seeks to manage impacts from existing and consented growth in the future at the airport. The measures in the ASAS are included in the future baseline modelling for the airport.

16.9.50 **ES Appendix 5.4.1: Surface Access Commitments** (Doc Ref. 5.3) provides quantified commitments for future mode share under the Project. The SACs provide the information to support future transport modelling in the form of passenger and staff numbers accessing the airport, and the proportions of each transport mode (road, rail, other public transport, active travel etc).

16.9.51 Modelling of freight transport impacts has been carried out separately in addition to modelling for passengers and staff. Commercial freight transport emissions have been estimated based on the forecast volumes of commercial freight services that would operate through Gatwick both without and with the Project. The modelling of freight emissions adopts a conservative approach by assuming all associated freight journeys are undertaken by HGV for their full arriving or onward journeys.

16.9.52 The modelling of GHG emissions arising from surface access and freight includes the effects of the future decarbonisation of road and rail transport. Various factors are expected to contribute to the decarbonisation of surface access in future, including policies supporting the ending of sales of internal-combustion-engine vehicles; increasing uptake of electric passenger vehicles; decarbonisation of electricity for electric road vehicles and trains; and policy supporting increased active travel and use of public transport. The estimation of the rates at which transport will decarbonise between 2018 and 2050 are based on the projections including within the UK TDP (Department for Transport, 2021).

16.9.53 Estimated emissions from surface access are presented in Table 16.9.7.

Table 16.9.7: Future Surface Access Emissions for the Project (Opening/Design/Future/Net Zero Years)

Emissions Totals	Baseline Year GHG Emissions ($MtCO_2e$)	Opening Year GHG Emissions ($MtCO_2e$)	Design Year GHG Emissions ($MtCO_2e$)	Future Year GHG Emissions ($MtCO_2e$)	Net Zero Year ($MtCO_2e$)
	2018	**2029**	**2038**	**2047**	**2050**
With Project					
Passenger access	0.332	0.246	0.117	0.031	0.014
Staff access	0.031	0.020	0.008	0.002	0.001
Commercial freight impacts	0.006	0.007	0.005	0.001	0.001
Total	**0.368**	**0.273**	**0.130**	**0.035**	**0.016**

Contextualising the Emissions

16.9.54 In line with IEMA guidance (Institute of Environmental Management and Assessment, 2022) the starting point for assessment of effects is to compare the future emissions with the UK Carbon Budgets for those periods where budgets currently exist. Emissions have been calculated for each of the five-year budget periods and the absolute emissions, as well as the net change attributable to the Project, are presented against the total UK Carbon Budgets for each in Table 16.9.8.

Table 16.9.8: Comparison of Surface Access Emissions to UK Carbon Budgets

Carbon Budget	Period	Five-Year Carbon Budget ($MtCO_2e$)	Future Baseline Surface Access Emissions for Five-Year Budget Period ($MtCO_2e$)	Future With-Project Surface Access Emissions for Five-Year Period ($MtCO_2e$) [24]	Net Increase between With-Project and Baseline Surface Access Emissions ($MtCO_2e$)	Contribution to Carbon Budget of Total Future Airport Surface Access Emissions (%)	Contribution to Carbon Budget of Net Future With-Project Surface Access Emissions (%)
Third Carbon Budget	2018 – 2022	2,544	1.755	1.755	-	0.069%	-
Fourth Carbon Budget	2023 – 2027	1,950	1.581	1.581	-	0.082%	-
Fifth Carbon Budget	2028 – 2032	1,725	1.226	1.310	0.085	0.076%	0.005%
Sixth Carbon Budget	2033 – 2037	965	0.767	0.904	0.137	0.094%	0.014%

[24] Emissions are presented for Domestic Aviation only for the Third, Fourth and Fifth Carbon Budgets. International aviation was brought within scope only at the introduction of the Sixth Carbon Budget. All values also include APU and Engine testing emissions.

16.9.55 In all periods the emissions from the Project are equal or higher than those in the future baseline.

16.9.56 The comparison of surface access emissions to the Carbon Budgets indicate they are very small for all periods, not exceeding 0.1% of the total emissions for the budget period in any individual five-year period. The comparison of net emissions changes arising from the Project are smaller again.

16.9.57 IEMA additionally recommends further contextualisation of emissions to support the appraisal of significance. For this appraisal the future emissions are contextualised against the Balanced Net Zero Pathway for Surface Transport contained in the Sixth Carbon Budget report (Committee on Climate Change, 2022).

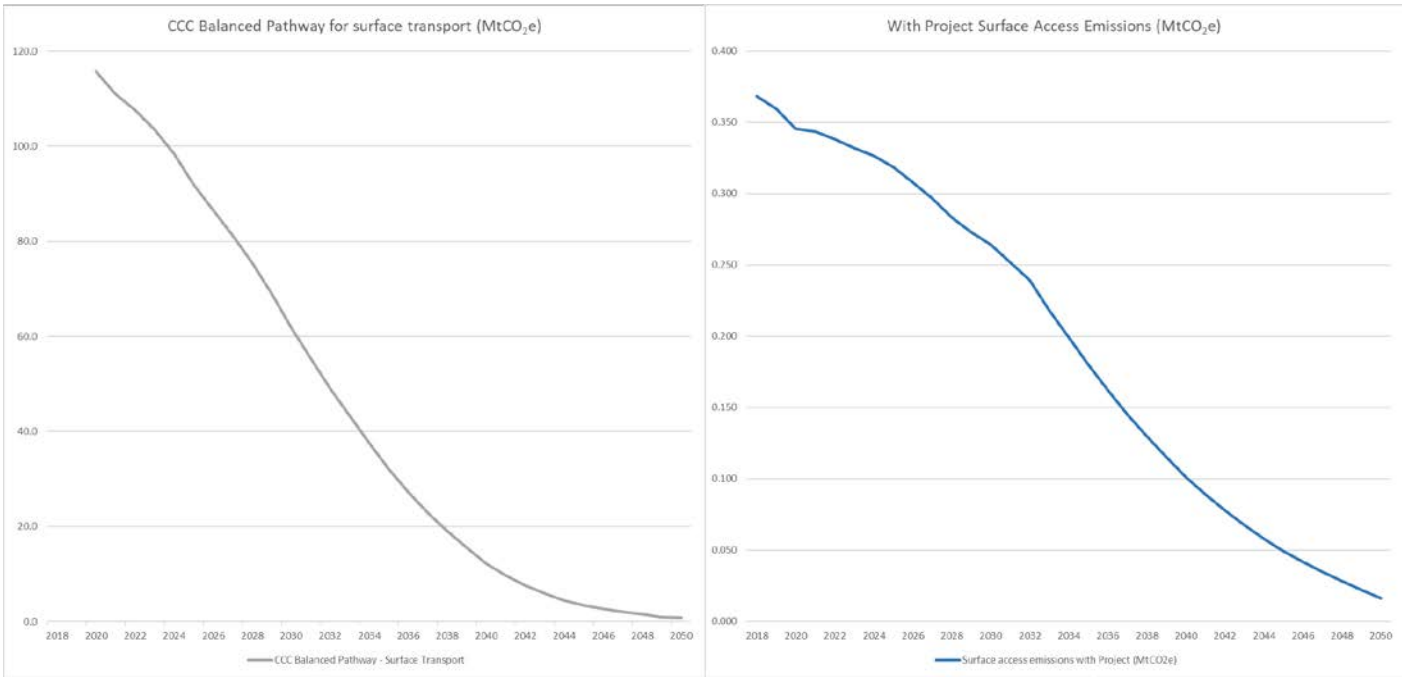
16.9.58 Direct comparison of the Project and the CCC trajectories is impractical as the trajectory for national surface access emissions is approximately 300 times the scale of the modelled surface access emissions for the Project. However, the projections for surface access with the Project are shown alongside the CCC trajectory for comparison. While this provides some contextualisation in considering the overall rates of decarbonisation it requires careful consideration for several reasons:

- It provides estimated emissions for the whole Airport including the Project, rather than just net-increase in emissions from the Project.
- It is, effectively, a cumulative quantification of surface access emissions including impacts arising from other consented or planned development. In this way the resulting emissions levels are not wholly attributable to the Project, but also reflect other consented development.
- National projections of emissions from surface access by definition represent geographical averages across the UK as a whole, and do not reflect the specific geography, infrastructure and travel patterns for the area covered by the strategic transport modelling.

16.9.59 Diagram 16.9.2 presents side-by-side trajectories for surface access emissions under the following scenarios:

- The trajectory for decarbonisation of surface access taken from the CCC Balanced Net Zero Pathway for Surface Transport.
- The with-Project scenario, including SAC measures, and incorporating assumptions on sectoral changes to fleet and efficiency aligned with the TDP.

Diagram 16.9.2: Comparison of Project Surface Access Emissions with CCC Balanced Pathway Trajectory



16.9.60 Table 16.9.8shows that the emissions for the with-Project scenario are larger than for the without-Project scenario (as might be expected in the absence of other factors given increased passenger and staff numbers under the Project). Diagram 16.9.2 shows that while emissions are increased with the Project, it is clear that the long-term projection is for these to decrease significantly in the period to 2050 under the influence of both the airport SAC (and the actions taken by GAL to achieve these) and the wider exogenous factors that will decarbonise road and rail transport under the TDP.

16.9.61 IEMA guidance (Institute of Environmental Management and Assessment, 2022) on the assessment of significance directs that this must consider the contextualisation exercise and also consideration of other factors including: increases or decreases in emissions; alignment with policy; mitigation measures (where there is sufficient control to effect these); and alignment with an appropriate net zero trajectory.

16.9.62 GAL does not have full control over emissions from surface access but can, and is committed to, implementing a range of measures inside and outside the airport boundary to mitigate the effects of surface access trips on emissions. The measures adopted by GAL and committed to under the SAC are subject to annual monitoring and reporting.

16.9.63 Residual surface access emissions arising from surface access remain greater for the Project than in the absence of the Project, but the scale of contribution to national Carbon Budgets is small. Surface access emissions increase from the baseline position, but these broadly align with a decarbonising trajectory out to 2050 from the CCC Balanced Pathway. Additionally, the trajectory presented is for the full with-Project GHG emissions rather than solely the net gains arising from the Project. On this basis it is concluded that surface access results in a **Minor Adverse Not Significant Effect.**

Aviation Emissions

16.9.64 The projected emissions from aircraft in the future with-Project scenario are based on modelling of the forecasted flight destinations and aircraft types with the Project. They also reflect changes in the expected aircraft fleet in the period to 2038, and include average annual engine efficiency improvements beyond 2038, SAF uptake, and the forecast uptake in zero emissions aircraft out to 2050 in line with the Jet Zero High Ambition scenario. The future aviation emissions for the Project are presented in Table 16.9.9.

Table 16.9.9: Future Aviation Emissions for the Project (Opening/Design/Future/Net Zero Years)

Emissions Totals	Baseline Year GHG Emissions ($MtCO_2e$)	Opening Year GHG Emissions ($MtCO_2e$)	Design Year GHG Emissions ($MtCO_2e$)	Future Year GHG Emissions ($MtCO_2e$)	Net Zero Year ($MtCO_2e$)
	2018	**2029**	**2038**	**2047**	**2050**
With Project					
Domestic flights	0.115	0.092	0.072	0.035	0.031
International flights	4.618	5.471	5.488	3.835	3.429
Other aviation fuel use	0.023	0.025	0.023	0.017	0.015
Total	**4.756**	**5.588**	**5.583**	**3.888**	**3.476**

Contextualising the Emissions

16.9.65 In line with IEMA guidance (Institute of Environmental Management and Assessment, 2022) the starting point for assessment of effects is to compare the future emissions with the UK Carbon Budgets for those periods where budgets currently exist. Emissions have been calculated for each of the five-year budget periods and the absolute emissions from the airport, as well as the net change attributable to the Project, are presented against the Carbon Budgets in Table 16.9.10.

Table 16.9.10: Comparison of Aviation Emissions to UK Carbon Budgets

Carbon Budget	Period	Five-Year Carbon Budget ($MtCO_2e$)	Future Baseline Aviation Emissions for Five-Year Budget Period ($MtCO_2e$) [25]	Future With-Project Aviation Emissions for Five-Year Budget Period ($MtCO_2e$)	Net Increase between With-Project and Baseline Aviation Emissions ($MtCO_2e$)	Contribution to Carbon Budget of Total Future Airport Aviation Emissions (%)	Contribution to Carbon Budget of Net Future With-Project Aviation Emissions (%)
Third Carbon Budget	2018 – 2022	2,544	0.454	0.454	-	0.018%	-
Fourth Carbon Budget	2023 – 2027	1,950	0.552	0.552	-	0.028%	-
Fifth Carbon Budget	2028 – 2032	1,725	0.571	0.580	0.009	0.034%	0.001%
Sixth Carbon Budget	2033 – 2037	965	23.766	29.321	5.555	3.038%	0.576%

[25] Emissions are presented for Domestic Aviation only for the 3rd, 4th, and 5th Carbon Budgets. International aviation was brought within scope only at the introduction of the 6th Carbon Budget. All values also include APU and Engine Testing emissions.

16.9.66 The Third and Fourth Carbon Budget periods see no change in domestic emissions as these fall prior to the assumed opening year[26]. Total aviation emissions are higher in the Fifth and Sixth budget periods for the Project when compared to the without-Project scenario (for full details see **ES Appendix 16.9.4: Aviation Greenhouse Gas Emissions** (Doc Ref. 5.3).

16.9.67 The comparison of aviation emissions to the Carbon Budgets indicate they are very small for all periods prior to the Sixth Carbon Budget, for which international aviation is included. For the Sixth Carbon Budget period the absolute emissions from all outgoing domestic and international aviation at the airport represents 3.038% of the five-year Carbon Budget for the UK. This value is prior to the use of any abatement outside of the aviation sector (ie offsetting, removals) that may arise under the Jet Zero Strategy (Department for Transport, 2022a).

16.9.68 The comparison of net change in aviation emissions (ie the comparison of aviation emissions arising with the Project and in the future baseline) is also small. For the Sixth Carbon Budget period (where international aviation is included) the net change in emissions is 0.576% of the total carbon budget for the five-year period. This value is prior to the use of any abatement outside of the aviation sector (ie offsetting, removals) that may arise under the Jet Zero Strategy.

16.9.69 In considering the significance of impacts it is important to note that IEMA guidance (Institute of Environmental Management and Assessment, 2022) directs that evaluation of significance is not primarily a question of magnitude for all but the largest projects, but that assessment should consider alignment with trajectories to meet net zero. To inform this IEMA recommends further contextualisation of emissions (beyond comparison solely with national carbon budgets) to support the appraisal of significance.

16.9.70 The Jet Zero Strategy provides the UK's policy trajectory to achieve net zero for the UK aviation sector by 2050, based on a range of measures that will reduce in-sector emissions, with residual emissions mitigated through out-of-sector abatement.

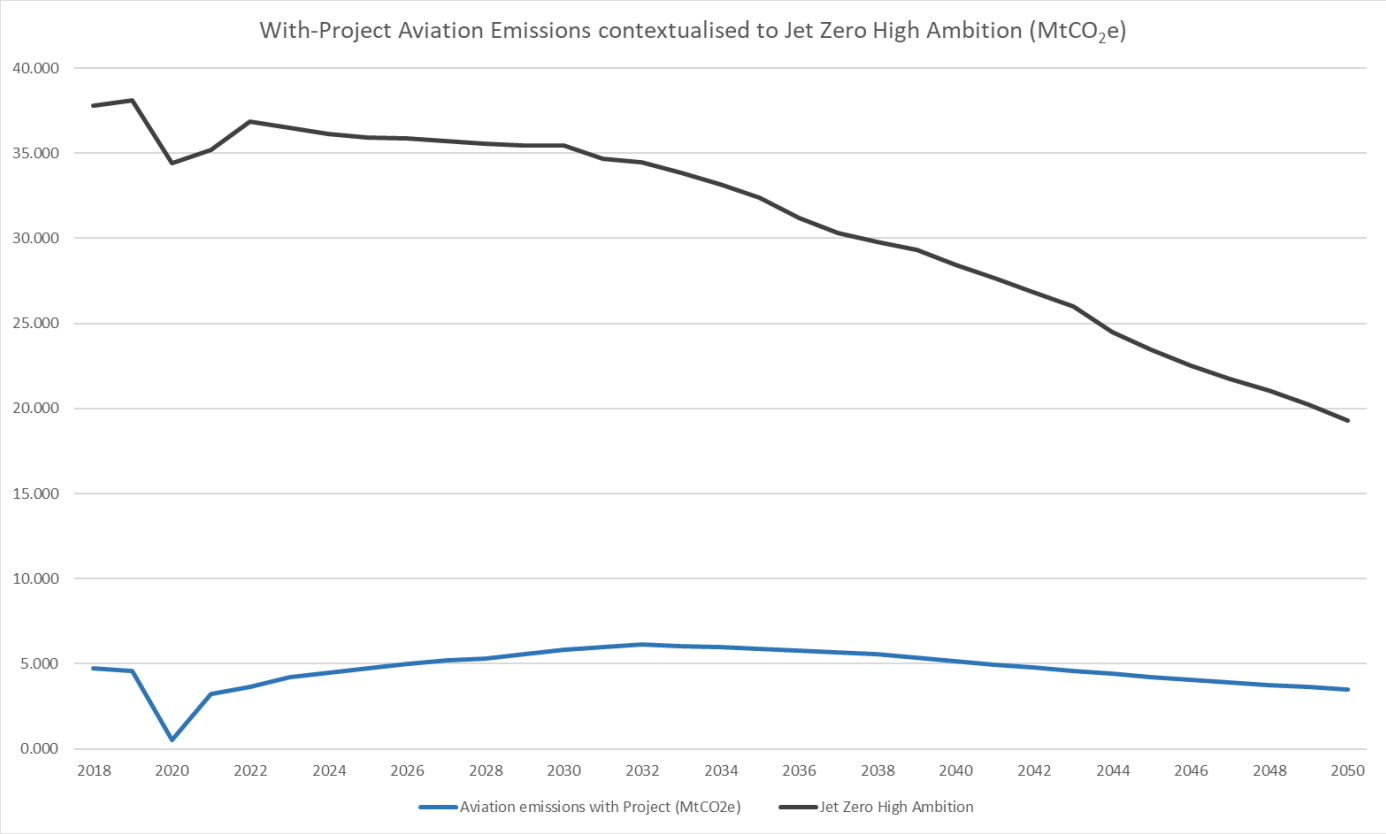
16.9.71 IEMA guidance recommends contextualisation against additional trajectories where appropriate, and where suitable trajectories can be identified. However, demonstrating compatibility with the trajectories developed either under Jet Zero or from the CCC is not technically straightforward - projected aviation emissions contained in the Jet Zero and CCC proposals are not tied to a specific airport – they reflect the sector as a whole and there is no reason to presuppose that the future emissions for any given airport should be tied to their historic contribution to national aviation emissions.

16.9.72 Diagram 16.9.3 presents a comparison of the residual emissions under the following scenarios:

- The with-Project scenario (i.e. for all airport aviation) including Jet Zero assumptions on efficiency, SAF uptake, and zero emission aircraft.
- The UK Jet Zero High Ambition scenario trajectory.

[26] International aviation emissions were not included within the UK carbon budgets until the Sixth Carbon Budget period.

Diagram 16.9.3: Comparison of Project Aviation Emissions with Jet Zero Residual Emissions Trajectory



16.9.73 It can be seen from Diagram 16.9.3 that emissions arising from Gatwick flights (for the whole Airport) increase out to 2032 under the with-Project scenario. From this point aviation emissions begin to decrease and are continuing on a downward trajectory to 2050.

16.9.74 In addition to the contextualisation exercise, IEMA guidance on the assessment of significance directs that this must also consider other factors including: increases or decreases in emissions; alignment with policy; mitigation measures (where there is sufficient control to effect these); and alignment with an appropriate net zero trajectory.

16.9.75 Given that the Project would lead to increases in GHG emissions from aviation it is reasonable to conclude an adverse impact arising from the Project.

16.9.76 The overall contribution of Gatwick aviation emissions in the with-Project scenario for the Sixth Carbon Budget period – at 3.038% for the Sixth Carbon Budget - reflect the scale of Gatwick as the UK's second largest airport (and are based on the airport as a whole, not the net impact of the Project). It is important to consider this portion of the UK budget within the context of a UK net zero budget setting process that explicitly acknowledges aviation as a hard-to-mitigate sector that will continue to emit GHGs out to 2050 and beyond (prior to out-of-sector abatement). However similarly it is important to recognise that Jet Zero establishes the UK Government's commitment to achieving net zero for the aviation sector across the UK, and its commitment to monitor progress, and respond accordingly to ensure this is met at an industry level. Jet Zero does not, however, seek to manage impacts arising from individual airports within this.

16.9.77 With regards to mitigation of aviation emissions, it is recognised that the primary action to reduce GHG emissions from aircraft will arise from government strategy at an industry scale, rather than directly through the influence of individual airport operators. To this end Jet Zero commits the UK Government to implementing measures to fulfil its legal duty on net zero, and to management of emissions from aviation within this. The role for GAL will be to actively support the transition to new aircraft technologies (innovative technologies such as hydrogen or electric aircraft) as these become demonstrable technologies. **ES Appendix 5.4.2: Carbon Action Plan** (Doc Ref. 5.3) commits GAL to play its full part and to consistently ensure that Gatwick is Jet Zero ready.

16.9.78 IEMA directs that the assessment of impact must also consider wider policy context as part of the appraisal, although notes that care must be taken to avoid comparison with policy that may lag behind the scale of emissions reductions required to meet net zero. The UK Jet Zero Strategy (Department for Transport, 2022a) provides the most up-to-date and relevant policy for the aviation sector as a whole and, specifically, the management of aircraft emissions at a national policy and sector level. It was produced in 2022 following a consultation exercise and with full cognisance of the UK's commitments to reach net zero in 2050.

16.9.79 The analysis used to inform the Jet Zero Strategy is based on identified plans for expansion/growth at UK airports. The Jet Zero Strategy concludes that identified growth is compatible with the in-sector targets detailed in the Strategy. The Strategy is clear (within the underlying datasets used for modelling) that data for individual airport projections used in modelling are not intended to indicate preference or acceptability of any specific airport achieving the modelled demand. However, the inclusion of projected growth under the Project within the Jet Zero Strategy modelling does demonstrate that the proposed growth at Gatwick under the Project does not conflict with the underlying assumptions and modelling that have informed Jet Zero. Further it demonstrates the conclusion by UK Government that Jet Zero can deliver a net zero strategy for UK aviation presupposing the levels of growth expected under the Project.

16.9.80 The Jet Zero Strategy provides the overarching policy framework for aviation emissions in the UK out to 2050, and provides recent and up-to-date modelling of the cumulative impacts from growth across the aviation sector in the UK. In light of the contextualisation of emissions from Gatwick compared to UK carbon budgets, and consistency with the strategic objectives and commitments made by UK Government through Jet Zero, it is concluded that the assessment of aviation results in a **Minor Adverse Not Significant Effect.**

Consideration of Slow Fleet Transition

16.9.81 The slow fleet transition (SFT) scenario would impact on the rate at which lower emission aircraft replace the existing fleet in the period to 2038.

- Under the main scenario aviation emissions with the Project increase to a maximum in 2032, before reducing year-on-year beyond this point.
- Under the SFT aviation emissions similarly peak at 2032, at a level approximately 3.6% higher than under the main scenario.

16.9.82 As shown in Table 16.9.11 (compared to Table 16.9.10), emissions are higher under the SFT; the maximum net effect of the SFT is in 2032. This is prior to the Sixth Carbon Budget period from 2037 and so the impact when contextualised to the national Carbon Budgets is very small. Under the SFT the contribution of aviation for the Airport (including increases arising from the Project) to

the UK Sixth Carbon budget is 3.132%, compared to a contribution of 3.038% under the core-case scenario.

16.9.83 The difference in net aviation emissions arising from the Project is an 0.584% increase in the Sixth Carbon Budget period under the SFT, compared to an 0.576% increase under the main scenario.

16.9.84 Given the minor scale of change arising from the SFT and considering the overarching Jet Zero framework would similarly be in place under the SFT scenario it is expected that future emissions from aviation will align with the UK Government trajectory as set out in Jet Zero. On this basis it is similarly concluded that the SFT scenario results in a **Minor Adverse Not Significant Effect**.

16.9.85 Further information on the modelling of the SFT scenario is presented in **ES Appendix 16.9.4: Aviation Greenhouse Gas Emissions** (Doc Ref. 5.3).

Table 16.9.11: Comparison of Aviation Emissions to UK Carbon Budgets under Slow Fleet Transition

Carbon Budget	Period	Five-Year Carbon Budget ($MtCO_2e$)	Future Baseline Aviation Emissions for Five-Year Budget Period under Slow Fleet Transition ($MtCO_2e$) [27]	Future with-Project Aviation Emissions for Five-Year Budget Period under Slow Fleet Transition ($MtCO_2e$)	Net Increase between With-Project and Baseline Aviation Emissions under Slow Fleet Transition ($MtCO_2e$)	Contribution to Carbon Budget of Total Future Airport Aviation Emissions under Slow Fleet Transition (%)	Contribution to Carbon Budget of Net Future With-Project Aviation Emissions under Slow Fleet Transition (%)
Third Carbon Budget	2018 – 2022	2,544	~~0.454~~0.455	~~0.454~~0.455	-	0.018%	-
Fourth Carbon Budget	2023 – 2027	1,950	~~0.552~~0.558	~~0.552~~0.558	-	~~0.028~~0.029%	-
Fifth Carbon Budget	2028 – 2032	1,725	~~0.571~~0.584	~~0.580~~0.593	0.009	0.034%	0.001%
Sixth Carbon Budget	2033 – 2037	965	~~23.766~~24.595	~~29.231~~30.226	~~5.555~~5.631	~~3.038~~3.132%	~~0.576~~0.584%

[27] Emissions are presented for Domestic Aviation only for the Third, Fourth, and Fifth Carbon Budgets. International aviation was brought within scope only at the introduction of the Sixth Carbon Budget. All values also include APU and Engine testing emissions.

Further Mitigation

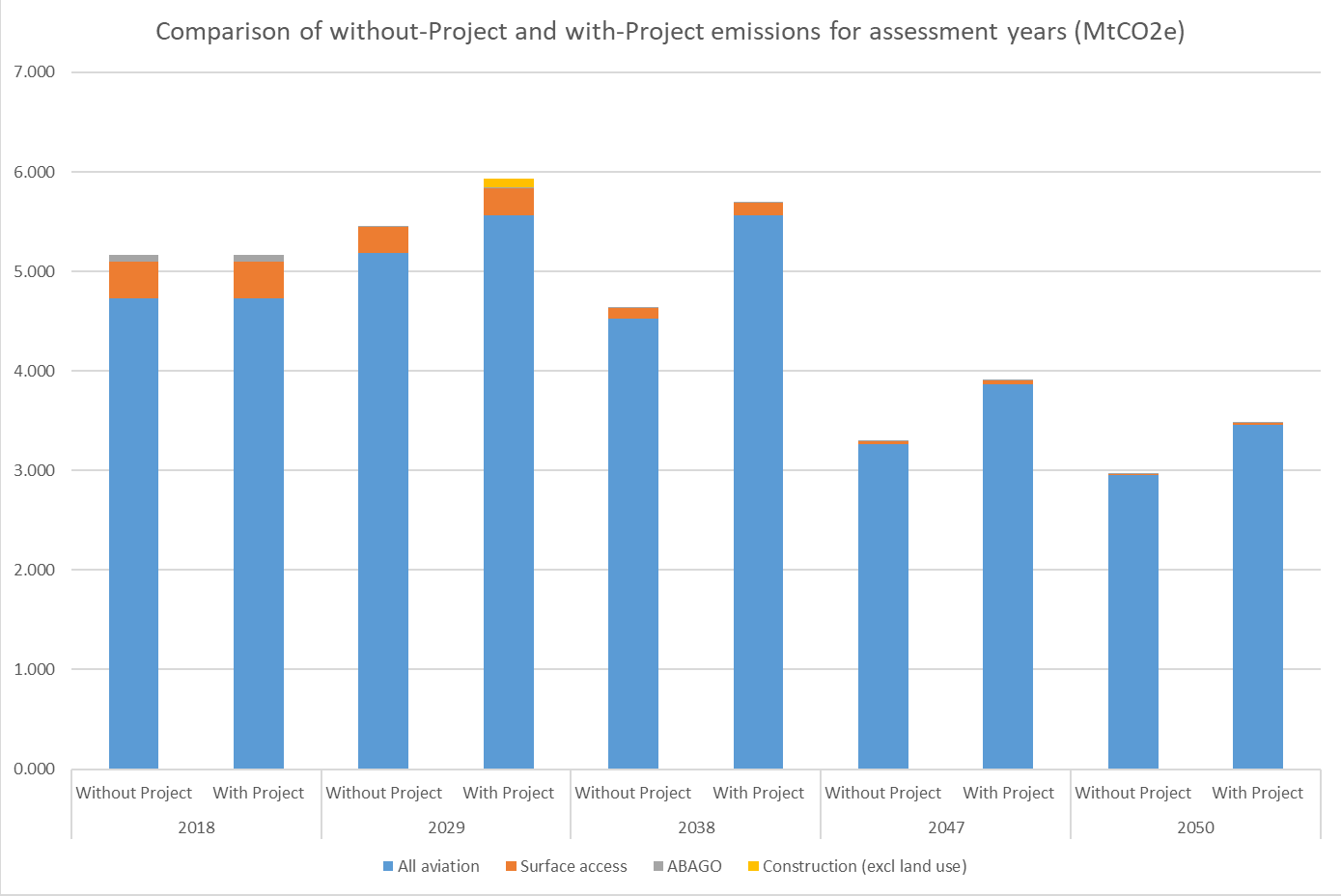
16.9.86 As not significant effects have been identified, there is no further mitigation proposed. As a result the assessment of residual effects remains unchanged from that set out above. Some of the measures identified in the CAP and the SACs are expected to drive further carbon reductions but these have not been relied upon in this assessment.

Aggregating Appraisal of GHG Emissions

16.9.87 The previous sections have considered the impacts within each emissions category in order to assess their impact within their specific context, as different opportunities are available to contextualise within different sectors of the UK economy. This aligns with the guidance from IEMA (Institute of Environmental Management and Assessment, 2022) that seeks to assess impacts compared to their respective contexts.

16.9.88 However, it is also necessary to consider the aggregate impacts of emissions from all sources. These are heavily influenced by aviation emissions that are much larger than all other emissions categories. Comparative emissions for the assessment years of 2029, 2038, 2047 and 2050 are presented in Diagram 16.9.4.

Diagram 16.9.4: Comparison of Without-Project and With-Project GHG Emissions for 2029, 2038, 2047 and 2050



16.9.89 The appraisal must be considered in the context of the updated IEMA guidance which provided a change from the prior presupposition that all increases in emissions are significant. The updated guidance directs that where emissions trajectories are compatible with a 1.5°C trajectory, and where the project complies with up-to-date policy and best practice, that it can conclude the project as Not Significant even where residual emissions remain.

16.9.90 Consideration of the overall significance of the Project, and specifically with regards to decision making, can only be carried out by considering impacts in the context of the national Carbon Budgets in line with the ANPS. The range of emissions arising from the Project have been considered individually to support the more contextualised and temporal assessment required to align with the IEMA guidance.

16.9.91 Table 16.9.13 compares the aggregate impacts across the four categories (including both baseline and Project emissions aggregated) against the Carbon Budgets for the relevant periods.

Appraisal of 'Worst-Case' Years

16.9.92 The Airports NPS requires that a 'worst-case' scenario is assessed as part of the GHG assessment. Worst-case has been interpreted as both the year of highest aggregated emissions, and the year in which emissions differ to the greatest extent from the baseline. The worst-case emissions are shown in Table 16.9.12.

Table 16.9.12: Assessment of Worst-Case Year Emissions

Emissions Source	Worst-Case Year	Emissions ($MtCO_2e$)	Difference from Baseline ($MtCO_2e$)
Highest aggregate emissions	2032	6.432	+1.288
Greatest increase over baseline	2032	6.432	+1.288
Highest annual construction emissions	2025	0.162	+0.140

Table 16.9.13: Comparison of Total With-Project Emissions to UK Carbon Budgets

Carbon Budget	Period	Five-Year Carbon Budget ($MtCO_2e$)	Future Baseline Emissions for the Five-Year Period ($MtCO_2e$)	Future With-Project Emissions for the Five-Year Period ($MtCO_2e$)[28]	Net Increase between With-Project and Baseline Emissions ($MtCO_2e$)	Contribution to Carbon Budget of Total Future Airport Emissions (%)	Contribution to Carbon Budget of Net Future With-Project Emissions (%)
Third Carbon Budget	2018 – 2022	2,544	2.446	2.446	-	0.096%	-
Fourth Carbon Budget	2023 – 2027	1,950	2.342	2.817	0.475	0.144%	0.024%
Fifth Carbon Budget	2028 – 2032	1,725	1.821	2.398	0.577	0.139%	0.033%
Sixth Carbon Budget	2033 – 2037	965	24.439	30.265	5.825	3.136%	0.604%

[28] Emissions are presented for Domestic Aviation only for the Third, Fourth, and Fifth Carbon Budgets. International aviation was brought within scope only at the introduction of the Sixth Carbon Budget. All values also include APU and Engine testing emissions.

Appraisal of Overall Significance

16.9.93 As with the appraisal of aviation, the contribution for the Sixth Carbon Budget (Committee on Climate Change, 2022) reflects the increased scope of the budget to include international aviation. Within the total emissions value of 30.265 $MtCO_2e$ in the Sixth Carbon Budget period, 95% of this is attributable to aviation impacts.

16.9.94 The with-Project scenario (reflecting the total impacts arising from the airport including already consented activity) is very small for all periods except for the Sixth Carbon Budget, where it represents a greater portion of the budget period total.

16.9.95 However, as noted above, this is dominated by aviation impacts and the assumptions made are consistent with, and assume the application of, government policy that commits the UK Government to delivering net zero aviation by 2050, and ensuring a policy context that supports the decarbonisation of the aviation sector to achieve this.

16.9.96 Given the overarching policy framework for the aviation sector, and the small contribution of other non-aviation emissions, it is concluded that for decision-making purposes (reflecting the guidance contained in the ANPS) the Project **is not so significant that it would have a material impact on the ability of Government to meet its carbon reduction targets, including Carbon Budgets**.

16.9.97 On this basis the overall assessment concludes that the Project has a **Minor Adverse Not Significant** impact.

Future Monitoring

16.9.98 GAL is committing to a monitoring regime within the CAP, and additionally in support of the SAC.

16.9.99 **ES Appendix 5.4.2: Carbon Action Plan** (Doc Ref. 5.3) sets out GAL commitments across construction, ABAGO, and aviation emissions.

16.9.100 GAL would prepare an annual Monitoring Report, setting out performance against the commitments within the CAP. This report would set out the methodology and data used for assessing performance, and would report on progress against/compliance with the commitments set out in the CAP. It would also identify any new measures that GAL intends to implement over the following year to ensure continued progress against commitments. The Monitoring Report would be supported by independent third party review and accreditation for quantifiable outcome reporting. Further information can be found in **ES Appendix 5.4.2: Carbon Action Plan** (Doc Ref. 5.3).

16.9.101 With regards to surface access, GAL commits to undertaking a monitoring exercise based on a range of data sources as set out in the SAC. GAL would produce an Annual Monitoring Report which would identify performance against the commitments contained in the SAC. Further information can be found in **ES Appendix 5.4.1: Surface Access Commitments** (Doc Ref. 5.3).

16.10 Cumulative Effects

16.10.1 The assessment of cumulative effects is intended to examine how the impacts arising from the Project might cumulatively impact upon individual receptors when other consented or planned development takes place.

16.10.2 However, the assessment of cumulative impacts as carried out for other environmental topics is not transferable to the assessment of GHG emissions in an analogous way. Impacts arising from GHG emissions differ from other environmental impacts in several important ways:

- The environmental impact arising from GHGs is the aggregation and increased concentration of GHGs within the atmosphere.
- The location of the emissions source is not relevant to the impact arising from it; it is not feasible to identify a Zone of Influence (ZoI) for GHG emissions at any geographic scale greater than the global scale. Any development leading to GHG emissions has the same impact whether it is located near to Gatwick or in another region/country.
- The climate change impacts on a given location arise from the aggregated GHG levels in the atmosphere, not from the magnitude of GHG emissions in the local area.

16.10.3 It is precisely for this reason that the strategic approach adopted by the UK, and other, governments is to develop a set of increasingly stringent Carbon Budgets at a national scale to manage and monitor progression towards the UK's 2050 net zero carbon target.

16.10.4 The inappropriateness of undertaking a cumulative appraisal (other than by contextualising against Carbon Budgets) is reflected in the IEMA guidance. This guidance notes that *'effects from specific cumulative projects…should not be individually assessed, as there is no basis for selecting any particular (or more than one) cumulative project that has GHG emissions for assessment over any other'.*

16.10.5 The comparison of each emissions category to the UK Carbon Budgets, and to a sector-based net zero trajectory, effectively provides this cumulative assessment. Additionally, the overall comparison of emissions from all aggregated sources to the UK Carbon Budgets also provides a cumulative appraisal.

16.10.6 Furthermore, the appraisal of the largest single emissions source – aviation – has been carried out based on comparison with the Jet Zero Strategy (Department for Transport, 2022a) and its underlying datasets and analysis. The exercise undertaken by UK Government in preparation of the Jet Zero Strategy is, in fact, a cumulative sectoral assessment for the aviation sector in the UK. No other individual would be able to undertake a cumulative assessment of aviation emissions and future emissions that would better the analysis undertaken by UK Government to inform the Jet Zero Strategy.

16.10.7 The Jet Zero Strategy states that:

'(Jet Zero) analysis uses updated airport capacity assumptions consistent with the latest known expansion plans at airports in the UK[29]… (and that) the (Jet Zero) analysis indicates that it is possible for the potential carbon emissions resulting from these

[29] This analysis includes the growth arising from the Project assuming that runway capacity increases to 386,000 ATMs by 2050.

expansion schemes to be accommodated within the planned trajectory for achieving net zero emissions by 2050.'

16.10.8 Finally, it should be noted that the second largest contributing emissions source – that of surface access – also represents a cumulative assessment of surface access emissions inasmuch as it is based on the strategic transport model for the Project. This strategic model includes consideration of known other development that will impact upon transport networks and, as such, the additional demands placed on the transport network by the Project are already considered cumulatively with other known development that will affect that network.

16.10.9 On the basis of the points above it is not considered necessary and/or practicable to present a cumulative assessment of the Project on GHG emissions.

16.11 Inter-related Effects

16.11.1 The assessment of GHG emissions has taken into account data from a range of emissions sources which are related to other environmental topics (eg construction processes, transport impacts, air quality assessment). Beyond these links there are no further inter-related effects between the assessment of GHG emissions arising from the Project and effects on other environmental topics.

16.12 Summary

16.12.1 The GHG assessment has assessed the calculated GHG emissions arising from the Project and contextualised these both individually within emissions categories (to support sector specific contextualisation) and in aggregate compared to the UK carbon budgets. This confirms that the majority of emissions arise from aviation, representing approximately 96% of emissions associated with the airport under future operations with the Project implemented.

16.12.2 Table 16.12.1 shows a summary of the residual effects, while Table 16.12.2 shows a summary of the assessment of significance of each emissions category.

Table 16.12.1: Assessment of Residual Effects

Emissions Category	Assessment of Significance
Construction	Minor Adverse Not Significant Effect
ABAGO	Minor Adverse Not Significant Effect
Surface Access	Minor Adverse Not Significant Effect
Aviation	Minor Adverse Not Significant Effect

16.12.3 Given the overarching contribution to emissions arise from aviation, and the policy context in the UK the reflects the Jet Zero Strategy (Department for Transport, 2022a), it is concluded that the overall impacts arising from the Project are not **so significant that the Project would have a material impact on the ability of Government to meet its carbon reduction targets, including Carbon Budgets.** On this basis the overall assessment concludes that the Project has a **Minor Adverse Not Significant** impact.

Table 16.12.2: 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 Period							
Global atmosphere	High	Emissions arising from construction activities	Long-term	There is no significance threshold to determine magnitude of impact.	Not Significant	Not Significant in EIA terms	Impact is objectively small in the context of the UK Carbon Budgets and is mitigated through commitments set out in **ES Appendix 5.4.2: Carbon Action Plan** (Doc Ref. 5.3).
Operation Period							
Global atmosphere	High	Emissions arising from changes to ABAGO activity levels	Long-term	There is no significance threshold to determine magnitude of impact.	Not Significant	Not Significant in EIA terms	Impact is objectively small in the context of the UK Carbon Budgets; and emissions align with an appropriate trajectory that aligns with the UK net zero targets for 2050. Impacts are mitigated through commitments set out in **ES Appendix 5.4.2: Carbon Action Plan** (Doc Ref. 5.3).
Global atmosphere	High	Emissions arising from changes to	Long-term	There is no significance threshold to	Not Significant	Not Significant in EIA terms	Impact is objectively small in the context of the UK Carbon Budgets; and emissions align with an

Receptor	Receptor Sensitivity	Description of Impact	Short- / Medium- / Long-Term / Permanent	Magnitude of Impact	Significance of Effect	Significant / Not Significant	Notes
		surface access activity levels		determine magnitude of impact.			appropriate trajectory that aligns with the UK net zero targets for 2050. Impacts are mitigated through commitments set out in **ES Appendix 5.4.2: Carbon Action Plan** (Doc Ref. 5.3).
Global atmosphere	High	Emissions arising from changes to aviation activity levels	Long-term	There is no significance threshold to determine magnitude of impact.	Not Significant	Not Significant in EIA terms	Impact is objectively small in the context of the UK Carbon Budgets extending to 2032 but showing an increase in the context of UK Carbon Budget for 2033-37 when international aviation is included. These represent total Gatwick airport emissions with the Project, rather than the net emissions arising from the Project which are appreciably smaller still. Aviation emissions will be managed in a sectoral way to ensure the trajectory to net zero by 2050 through the Government's Jet Zero Strategy.

16.13 References

British Standards Institute (2011) *BS EN 15978 Sustainability of Construction Works*.

British Standards Institute (2016) *PAS 2080 Carbon Management in Infrastructure*.

Civil Aviation Authority (2021) *Airspace change: Guidance on the regulatory process for changing the notified airspace design and planned and permanent redistribution of air traffic, and on providing airspace information.*

Committee on Climate Change (2012) *Scope of carbon budgets: Statutory advice on inclusion of international aviation and shipping*.

Committee on Climate Change (2019) *Net Zero – the UK's contribution to stopping global warming*.

Committee on Climate Change (2022) *Sixth Carbon Budget*.

Department for Business, Energy & Industrial Strategy (2023) *Green Book supplementary guidance: valuation of energy use and greenhouse gas emissions for appraisal.*

Department for Transport (2013) *The UK Aviation Policy Framework*.

Department for Transport (2014) *National Policy Statement for National Networks*.

Department for Transport (2018a) *The Airports National Policy Statement*.

Department for Transport (2018b) *Aviation 2050 Strategy*.

Department for Transport (2018c) *2018 Beyond the Horizon - Making best use of existing runways*.

Department for Transport (2021) *Transport Decarbonisation Plan*.

Department for Transport (2022a) *Jet Zero Strategy: delivering net zero aviation by 2050*.

Department for Transport (2022b) *Flightpath to the future: a strategic framework for the aviation sector*.

Department for Transport (2022c) *Transport analysis guidance.*

European Environment Agency (2019) *EMEP/EEA air pollutant emission inventory guidebook 2019: Technical guidance to prepare national emission inventories*.

European Union Aviation Safety Agency (2021) *ICAO Aircraft Engine Emissions Databank*.

Gatwick Airport Limited (GAL) (2019a) Environmental Impact Assessment Scoping Report.

Gatwick Airport Limited (GAL) (2019b) *2018 Greenhouse Gas Assessment.*

Gatwick Airport Limited (GAL) (2021) *Second Decade of Change to 2030.*

Gatwick Airport Limited (GAL) (2022) *Airport Surface Access Strategy 2022-2030.*

International Civil Aviation Organisation (ICAO) (2016) *Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA)*.

Institute of Environmental Management and Assessment (2022) *Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance 2nd Edition*.

Ministry of Housing, Community and Local Government (2021) *The National Planning Policy Framework*.

Planning Inspectorate (2019) *Proposed Gatwick Airport Northern Runway: Scoping Opinion*. TR020005-000043-GTWK-Scoping Opinion.pdf

Intergovernmental Panel on Climate Change (2014) *Fifth Assessment Report (AR5) Synthesis Report*.

The Royal Institution of Chartered Surveyors (2014) *Methodology to calculate embodied carbon*.

The Royal Institution of Chartered Surveyors (2017) *Whole life carbon assessment for the built environment*.

UK Government (2008) *Climate Change Act 2008*.

UK Government (2017) *The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017*.

UK Government (2020) *The Greenhouse Gas Emissions Trading Scheme Order*.

United Nations Framework Convention on Climate Change (2018) *The Paris Agreement*.

World Business Council for Sustainable Development and World Resources Institute (2015) *The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard*.

16.14 Glossary

Table 16.14.1: Glossary of Terms

Term	Description
ABAGO	Airport buildings and ground operations
ANPS	Airports National Policy Statement
APU	Auxiliary Power Unit
ASAS	Airport Surface Access Strategy
ATM	Air Transport Movement
CAP	Carbon Action Plan
CCC	Committee on Climate Change
CCD	Climbing Cruise Descent
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent

CORSIA	Carbon Offsetting and Reduction Scheme for International Aviation
DCO	Development Consent Order
EEA	European Economic Area
EIA	Environmental Impact Assessment
ES	Environmental Statement
ETS	Emission Trading Scheme
FEGP	Fixed Electrical Ground Power
GAL	Gatwick Airport Limited
GHG	Greenhouse Gas(es)
HGV	Heavy Goods Vehicle
ICAO	International Civil Aviation Organization
IEMA	Institute of Environmental Management and Assessment
kWh	Kilowatt hour
LTO	Landing and Take-off
mppa	Million passengers per annum
$MtCO_2e$	Metric tons of carbon dioxide equivalent
NPPF	National Planning Policy Framework
NPS	National Policy Statement
PEI	Preliminary Environmental Information
PEIR	Preliminary Environmental Impact Report
PINS	Planning Inspectorate
PPA	Power Purchase Agreement
REGO	Renewable Energy Guarantee of Origin
RF	Radiative Forcing
SAC	Surface Access Commitments
SAF	Sustainable Aviation Fuel
SFT	Slow Fleet Transition
tCO_2e	Tonnes of CO_2 equivalent
TDP	Transport Decarbonisation Plan
TWG	Topic Working Group
UNFCCC	United Nations Framework Convention on Climate Change