Preliminary Environmental Information Report
Chapter 13: Air Quality

September 2021

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13 Air Quality

13.1. Introduction

13.1.1 This chapter of the Preliminary Environmental Information Report (PEIR) presents the findings of the Environmental Impact Assessment (EIA) work undertaken to date concerning the potential effects of the proposal to make best use of Gatwick's existing runways (referred to within this report as 'the Project') on air quality and odour.

13.1.2 Air quality studies are concerned with the presence of airborne pollutants in the atmosphere. The main pollutants of concern for local air quality for this assessment are oxides of nitrogen (NOx), nitrogen dioxide (NO_2), particulate matter (PM_{10} and $PM_{2.5}$) and dust.

13.1.3 This PEIR chapter:

- sets out the existing and future environmental baseline conditions, established from desk studies, surveys and consultation to date;
- presents the potential environmental effects on air quality and odour arising from the Project, based on the information gathered and the analysis and assessments undertaken to date;
- identifies any assumptions and limitations encountered in compiling the environmental information; and
- highlights any necessary monitoring and/or mitigation measures that could prevent, minimise, reduce or offset the possible environmental effects identified in the EIA process.

13.1.4 This chapter is accompanied by the following appendices and figures:

- Chapter Figures 13.4.1, 13.6.1 and 13.9.1 to 13.9.12.
- Appendix 13.2.1: Local Planning Policy.
- Appendix 13.3.1: Summary of Stakeholder Scoping Responses.
- Appendix 13.4.1: Air Quality Assessment Method.
- Appendix 13.6.1: Air Quality Baseline Data and Model Verification.
- Appendix 13.6.2: Sensitive Receptors and Background Pollutant Concentrations.
- Appendix 13.8.1: Construction Phase Mitigation.
- Appendix 13.9.1: Air Quality Results Tables and Figures.
- Appendix Figures 1.1.1 to 1.1.4, 1.2.1 to 1.2.4, 2.1.1, 4.1.1 to 4.1.9 and 5.2.1 to 5.2.18.

13.1.5 The PEIR will inform pre-application consultation. Following consultation, comments on the PEIR will be reviewed and taken into account in preparation of the Environmental Statement (ES) that will accompany the application to the Planning Inspectorate for development consent.

13.2. Legislation and Policy

Legislation

European Air Quality Management Directives

13.2.1 In 1996, the European Commission published the Air Quality Framework Directive on ambient air quality assessment and management (96/62/EC). This Directive defined the policy framework for 12 air pollutants, including NO_2, known to have harmful effects on human health and the environment. Limit values (*pollutant concentrations not to be exceeded by a certain date*) for each

specified pollutant were set through a series of Daughter Directives: Directive 1999/30/EC for NO_2 and PM_{10} (amongst other pollutants), Directive 2000/69/EC for benzene and carbon monoxide, Directive 2002/3/EC for ozone, and Directive 2004/107/EC for certain toxic heavy metals and polycyclic aromatic hydrocarbons.

13.2.2 In May 2008, Directive 2008/50/EC on ambient air quality and cleaner air for Europe came into force. This Directive consolidated the above (apart from Directive 2004/107/EC), made provision for extended compliance deadlines for NO_2 and PM_{10} and introduced standards for $PM_{2.5}$.

13.2.3 The Directive has been transposed into national legislation in England by the Air Quality Standards Regulations 2010 (amended in 2016). In England, the Secretary of State for the Department of Environment, Food and Rural Affairs (Defra) has the duty of ensuring compliance with the air quality limit values.

National Emission Ceilings Directive

13.2.4 In December 2016, Directive 2016/2284/EU on the reduction of national emissions of certain atmospheric pollutants came into force (the National Emission Ceilings Directive). This Directive replaced previous versions, set emission ceilings for various pollutants and set emission reduction commitments for European member states (including for NOx and $PM_{2.5}$). The Directive has been transposed into national legislation in England by the National Emission Ceilings Regulations 2018.

Environment Act 1995

13.2.5 Part IV of the Environment Act 1995 places a duty on the Secretary of State for the Environment to develop, implement and maintain an air quality strategy with the aim of reducing atmospheric emissions and improving air quality. The air quality strategy (AQS) for England, Scotland, Wales and Northern Ireland (Defra *et al.*, 2007) provides the framework for ensuring compliance with air quality limit values based on a combination of international, national and local measures to reduce emissions and improve air quality. This includes the statutory duty, also under Part IV of the Environment Act 1995, for local authorities to undergo a process of local air quality management and declare Air Quality Management Areas (AQMA) where necessary.

Defra's Clean Air Strategy

13.2.6 Defra's Clean Air Strategy was published in January 2019 and aims to address the issue of air pollution, protect nature and boost the economy. The strategy sits alongside three others (Industrial, Clean Growth and 25 Year Environmental Plan). Actions in the document include reducing emissions from various sources, such as transport, domestic activities, farming and industry. There is also a long term target for reducing population exposure to $PM_{2.5}$ concentrations to meet the World Health Organisation's (WHO) target of 10µg/m^3 as an annual mean.

Draft Environment Bill

13.2.7 The draft Environment Bill (Defra, 2020a) is currently going through scrutiny in the United Kingdom (UK) Parliament and is at committee stage in the House of Lords. In January this year (2021) it was "*severely delayed*" for the third time from progressing through parliament and becoming part of UK law. The Bill is seen as an important step towards the UK tackling the environmental and climate crisis, addressing a range of environmental factors, including

improving air and water quality, protecting the wildlife, increasing recycling and reducing plastic waste. With regards to air quality, the Bill would set targets for pollutants of concern for human health such as "*a target in respect of the annual mean level of $PM_{2.5}$ in ambient air".* This $PM_{2.5}$ target may, but is not committed to being, a long term target and the Bill also does not commit to the WHO target of 10µg/m^3. The document does however provide local planning authorities with more powers to tackle air quality problems in their administrative areas.

Air Quality Standards

13.2.8 Some pollutants have standards expressed as annual average concentrations due to the chronic way in which they affect health or the natural environment (ie effects occur after a prolonged period of exposure to elevated concentrations) and others have standards expressed as 24-hour or 1-hour average concentrations due to the acute way in which they affect health or the natural environment (ie after a relatively short period of exposure). Some pollutants have standards expressed in terms of both long term and short term concentrations.

13.2.9 In this assessment, the term 'air quality standard' has been used to refer to both the UK objectives and European limit values. Table 13.2.1 sets out the air quality standards for the pollutants of most relevance to this assessment (NOx, NO_2, PM_{10} and $PM_{2.5}$). Other pollutants have been screened out of this air quality assessment, since they are not likely to cause exceedances of their respective standards. Should there be a need for other pollutants to be included in the assessment, these will be addressed in the ES.

Table 13.2.1: Air Quality Standards

Pollutant	Averaging Period	Air Quality Standard
Human Health		
Nitrogen dioxide (NO_2)	Annual mean	40 µg/m^3
	1-hour mean	200 µg/m^3, not to be exceeded more than 18 times a year (99.8th percentile)
Particulate matter (PM^{10})	Annual mean	40 µg/m^3
	24-hour mean	50 µg/m^3, not to be exceeded more than 35 times a year (90.4th percentile)
Fine particulate matter ($PM_{2.5}$)	Annual mean	25 µg/m^3
Natural Environment *		
Oxides of nitrogen (NOx)	Annual mean	30 µg/m^3

Source: Air Quality Standards Regulations 2010 (amended in 2016)

* The air quality standard for the natural environment is oxides of nitrogen, however further assessment is also undertaken in relation to nitrogen deposition. This is further described in Section 13.4 Assessment Methodology.

Planning Policy Context

13.2.10 The land-use planning process provides a key means of improving air quality, particularly in the long term, through the strategic location and design of new developments. Any air quality consideration that relates to land-use and its development can be a material planning consideration in the determination of planning applications, dependent upon the details of the proposed development.

Aviation Policy Framework and Strategy

13.2.11 The Aviation Policy Framework (APF) published in 2013 (Department for Transport, 2013) restated the Government's commitment to achieve full compliance with European air quality standards. It also stated that the policy in relation to air quality is to "*seek improved international standards to reduce emissions from aircraft and vehicles*". It further identifies road transport as the main source of pollution around airports, as ground level pollutant concentrations from aircraft emissions fall off significantly as aircraft climb to a higher altitude.

13.2.12 Following a call for evidence in July 2017, the Government published a new aviation strategy, Beyond the horizon: The future of UK aviation in April 2018 with the updated document (Aviation 2050: The future of UK aviation) (Department for Transport, 2018b) undergoing public consultation from December 2018 to June 2019. The document states that the government aims to *"achieve a safe, secure and sustainable aviation sector…provided that growth takes place in a sustainable way, with actions to mitigate the environmental impacts*". It will investigate whether the regulations, controls and incentives in place will tackle air quality concerns and *ensure that there is "a robust policy framework and package of measures to reduce the harmful effects of aviation on the environment, such as carbon emissions, air quality and noise*". As part of this wider aviation strategy, the Government also published a report on Making Best Use of existing runways in June 2018 (HM Government, 2018b). This policy was explicitly brought forward by Government in recognition of the value of providing early clarity on this important aspect of aviation policy.

National Policy Statements

13.2.13 The Airports National Policy Statement (Airports NPS) (Department for Transport, 2018a), although primarily provided in relation to a new runway at Heathrow Airport, remains a relevant consideration for other applications for airport infrastructure in London and the south east of England.

13.2.14 The NPS for National Networks (Department for Transport, 2014) sets out the need for development of road, rail and strategic rail freight interchange projects on the national networks and the policy against which decisions on major road and rail projects will be made[1]. This has been taken into account in relation to the highway improvements proposed as part of the Project.

13.2.15 Table 13.2.2 provides a summary of the relevant requirements of these NPSs and how they are addressed within the PEIR.

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

Table 13.2.2: Summary of NPS Information Relevant to this Chapter

Summary of NPS requirement	How and Where They Are Considered in the PEIR
Airports NPS	
Paragraph 5.33 sets a requirement for the assessment to assess existing air quality levels for all relevant pollutants, forecasts of levels for all relevant pollutants at the time of opening and any likely significant effects of the scheme, their mitigation and any residual effects. Paragraphs 5.42 and 5.43 set out the considerations for decision-making with regards to air quality.	The PEIR includes an assessment of existing air quality levels for all relevant pollutants in the study area. Baseline information is provided in Section 13.6. The assessment forecasts levels for all relevant air quality pollutants at the time of opening, with and without the Project in operation (Section 13.9). The assessment determines the significance of effects from construction and operation of the Project (Section 13.9). The assessment includes consideration of all areas which are likely to be particularly relevant to the decision-making by the Secretary of State. A summary of effects has been provided in Section 13.13 with relevant mitigation measures for construction and operation presented in Section 13.8.
NPS for National Networks	
Paragraphs 5.6 and 5.7 set out a requirement for projects which require EIA or affect the UK's ability to comply with the Air Quality Directive to undertake an assessment of the impacts of the proposed project. This should include a forecast of air quality at the time of opening and any significant air quality effects, their mitigation and any residual effects.	The assessment predicts impacts of the Project at the time of opening and determines the likely significance of effects during both construction and operation (Section 13.9). Relevant mitigation measures for construction and operation are presented in Section 13.8.

National Planning Policy Framework

13.2.16 The National Planning Policy Framework (NPPF) (Ministry of Housing, Community and Local Government, 2021) sets out the planning policies for England. Paragraph 186 of the NPPF on air quality states that:

"Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan."

13.2.17 Sustainable growth in terms of travel is discussed in paragraph 105:

"The planning system should actively manage patterns of growth in support of these objectives. Significant development should be focused on locations which are or can be made sustainable, through limiting the need to travel and offering a genuine choice of transport modes. This can help to reduce congestion and emissions, and improve air quality and public health. However, opportunities to maximise sustainable transport solutions will vary between urban and rural areas, and this should be taken into account in both plan-making and decision-making."

13.2.18 Paragraph 174 of the framework states that "*Planning policies and decisions should contribute to and enhance the natural and local environment*" and in relation to air quality, this can be achieved by:

"e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans…".

13.2.19 The National Planning Practice Guidance (NPPG) supports the NPPF and provides guidance across a range of topic areas. In relation to air quality, the guidance refers to the significance of air quality assessments to determine the impacts of proposed developments in the area and describes the role of local and neighbourhood plans with regard to air quality (Ministry of Housing, Communities and Local Government, 2019).

Local Planning Policy

13.2.20 Gatwick Airport lies within the administrative area of Crawley Borough Council and adjacent to the boundaries of Mole Valley District Council to the north west, Reigate and Banstead Borough Council to the north east and Horsham District Council to the south west. The administrative area of Tandridge District Council is located approximately 1.9 km to the east of Gatwick Airport, while Mid Sussex District Council lies approximately 2 km to the south east. Gatwick Airport is located in the county of West Sussex and immediately adjacent to the bordering county of Surrey.

13.2.21 The relevant local planning policies applicable to air quality based on the extent of the study area for this assessment are summarised in Table 13.2.3 and explained further in Appendix 13.2.1. These have been considered throughout this air quality assessment.

Table 13.2.3: Local Planning Policy

Administrative Area	Plan	Policy
Adopted Policy		
Crawley	Crawley Borough Council Air Quality Action Plan 2018	Priority 3 Sustainability (Planning and Policy Guidance)
	Crawley 2030: Crawley Borough Local Plan 2015 - 2030	Policy ENV12 Air Quality
Horsham	Horsham District Planning Framework (excluding South Downs National Park) 2015	Strategic Policy 24 Environmental Protection
Mid Sussex	Mid Sussex District Plan 2014 – 2031	DP29: Noise, Air and Light Pollution
Mole Valley	Mole Valley Core Strategy (2007)	CS Policy 20: Reduced Flood Risk and Environmental Pollution
Reigate and Banstead	Reigate and Banstead Local Plan: Core Strategy 2014	Policy CS9: Gatwick Airport
		Policy CS10 Sustainable development
	Reigate and Banstead Local Plan Development Management Plan 2019	Policy DES8: Construction management
		Policy DES9: Pollution and contaminated land
Tandridge	Tandridge District Core Strategy 2008	Policy CSP 16 Aviation Development
	Tandridge Local Plan Part 2: Detailed Policies 2014 – 2029	DP22: Minimising Contamination, Hazards & Pollution
Surrey County Council	Surrey County Council Electric Vehicle Strategy 2018	Surrey Transport Plan: Electric Vehicle Strategy
	Surrey County Council Low Emissions Transport Strategy 2018	Surrey Transport Plan: Low Emissions Transport Strategy
Emerging Policy		
Crawley	Draft Crawley Borough Local Plan 2021-2037	Policy EP5: Air Quality
		Strategic Policy GAT1: Development of the Airport with a Single Runway
		Strategic Policy SD1: Presumption in Favour of Sustainable Development
	Consultation on Proposed Changes to Crawley's Air Quality Management Area (AQMA)	Proposed extension to Hazelwick AQMA
Horsham	Draft Horsham District Local Plan 2019-2036	Strategic Policy 1 – Sustainable Development

Administrative Area	Plan	Policy
		Policy 25 – Strategic Policy: Environmental Protection
		Policy 26 – Air Quality
Mole Valley	Future Mole Valley 2018 – 2033 Consultation Draft Local Plan	Policy EN13: Promoting Environmental Quality
		Policy EN14: Responding to the Climate Emergency
Tandridge	Tandridge District Council Our Local Plan: 2033 (Regulation 22 submission)	TLP46: Pollution and Air Quality

13.3. Consultation and Engagement

13.3.1 In September 2019, Gatwick Airport Limited (GAL) submitted a Scoping Report (GAL, 2019) to the Planning Inspectorate, which described the scope and methodology for the technical studies being undertaken to provide an assessment of any likely significant effects and, where necessary, to determine suitable mitigation measures for the construction and operational phases of the Project. It also described those topics or sub-topics proposed to be scoped out of the EIA process and provided justification as to why the Project would not have the potential to give rise to significant environmental effects in these areas.

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

13.3.3 Key issues raised by the Planning Inspectorate during the scoping process specific to air quality are listed in Table 13.3.1, together with details of how these issues have been addressed in the PEIR. Details of additional consultee responses are provided in Appendix 13.3.1.

Table 13.3.1: Summary of Scoping Responses

Details	How/Where Addressed in PEIR
On the basis of the uncertainty regarding the specification of any energy and heating plant and aircraft auxiliary power units (APUs), and the fact that SO_2 is considered as a "relevant combustion product" for aviation projects by the CAA, the Inspectorate considers that assessment of these pollutants cannot be scoped out at present. The Applicant should demonstrate that it is unlikely to give rise to significant air quality effects from these pollutants through the provision of a detailed screening assessment where relevant (particularly in respect of SO_2). The ES should include an assessment of the impacts associated with activities involving other pollutants, where they are likely to give rise to significant effects.	Additional pollutants to those included in the assessment (NOx, NO_2, PM_{10} and $PM_{2.5}$) have been screened out at this stage as they are very unlikely to result in an exceedance of air quality standards. Sulphur emissions from road vehicles are not a concern for local air quality due to stringent legislation on liquid fuels which has reduced SO_2 emissions from gas oil and diesel fuel. A more detailed justification or assessment of SO_2 emissions from

Details	How/Where Addressed in PEIR
	aircraft engines will be provided in the ES. No other pollutants have been identified that would be likely to give rise to significant air quality effects.
Paragraphs 7.4.17 and 7.4.18 in relation to geology and ground conditions explain that a desk-based Phase 1 Preliminary Risk Assessment will be undertaken to include an assessment of potential sources of contamination at the site (from historical and current land uses) both on site and in the surrounding area, and that this will be used to determine the requirement for any additional intrusive investigation at the site. At present there remains a degree of uncertainty regarding the potential for odorous contaminated material to be disturbed by the Proposed Development. Accordingly, the Inspectorate is not in a position to agree to scope these matters from the assessment. The ES should (with reference to the phase 1 ground investigation studies) assess impacts from odorous material during construction where significant effects are likely to occur. The assessment of odorous materials should cross refer to other relevant aspects and matters in the ES to ensure that a robust assessment has been undertaken.	From the Project Description and expected works, no odorous materials are expected to be excavated during construction of the Project therefore this has not been assessed in the PEIR. This will be further verified in the ES following any updates from the contaminated land assessment.
The Inspectorate agrees that the jettisoning of fuel from aircraft can be scoped out of the air quality assessment on the basis that: ▪ It is an infrequent occurrence, only used in emergency situations; and ▪ If required, it would be at a high altitude (to vaporise the fuel and facilitate dispersion). The Inspectorate agrees that there is no potential for significant air quality effects from this activity. The Inspectorate also assumes that operational safety procedures are in place for such situations in connection with the existing operations at Gatwick.	No action needed.
The Scoping Report refers to the Institute of Air Quality Management (IAQM) guidance 'Assessment of dust from demolition and construction', and states that monitoring during construction will be included as part of the CoCP (if required). The need for monitoring during construction should be considered in accordance with the IAQM 'Air Quality Monitoring in the Vicinity of Demolition and Construction Sites'. In particular, the CoCP described at paragraphs 5.3.9 – 5.3.11 should be clear as to how the need for monitoring has been determined, how the construction air quality assessment relies on delivery of such monitoring.	A monitoring strategy will be agreed with the local planning authority and implemented through the Code of Construction Practice (CoCP). An outline CoCP is provided at Appendix 5.3.1. Further details in terms of air quality are also provided at Appendix 13.4.1. Riverside Garden Park has been assessed as a receptor in the construction dust

Details	How/Where Addressed in PEIR
Specific consideration of construction dust effects to the adjacent Riverside Garden Park will also need to be presented as part of the assessment (having regard to its proximity to the proposed North and South terminal junction works).	assessment in this PEIR assessment.
The Applicant acknowledges that SO_2 may contribute to acid and nutrient nitrogen deposition at natural ecosystems, but Table 7.7.3 only refers to "harm to ecological receptors due to increased NOx concentrations and nitrogen deposition". The Inspectorate considers that the assessment of air quality impacts on ecological receptors should be extended to consider SO_2.	Sulphur emissions from road vehicles, aircraft engines and other airport sources would not significantly affect the acidity at the ecological sites in this assessment, therefore acidity from sulphur has not been assessed. Sulphur emissions from road vehicles are not a concern for local air quality due to stringent legislation on liquid fuels which has reduced SO_2 emissions from gas oil and diesel fuel. Acidity from nitrogen has been taken into account in the assessment of the ecological sites reported in the Habitats Regulations Assessment (HRA).
Air Quality Management Areas (AQMAs) are presented in the Scoping Report with reference to the existing baseline conditions, but they are not specifically referenced further in terms of the proposed scope of the assessment. The Applicant sets out that the assessment of air quality effects will be informed by relevant transport modelling and this should be used to define an appropriate study area for the assessment of effects. Any impacts to AQMAs identified within the transport models should be assessed. For example, the A23 Horley AQMA may experience impacts given that a large proportion of the airport's passenger traffic comes from London and is likely to access the airport via the A23/M23 alongside relevant AQMAs on the M25. The impacts on the Hazelwick Roundabout AQMA should also be specifically considered during construction and operation given the works associated with the North and South Terminal junctions and the increased airport passenger and employee trip generation that is likely to affect this AQMA in particular.	Predicted modelled concentrations at receptors in the Horley and Hazelwick AQMAs are reported in this chapter (Section 13.9) for construction and operation and will also be reported in the ES. Air quality impacts at other AQMAs in the wider study area were assessed with the full list of modelled receptors and predicted concentrations in Appendix 13.9.1.
The Inspectorate notes that there are five continuous monitoring sites within 1 km of Gatwick Airport and a "wide network of diffusion tubes" from which to consider baseline data.	A Project-specific air quality survey was undertaken between 2016 and 2020 at key areas of concern around the airport. The PEIR contains full

Details	How/Where Addressed in PEIR
The Scoping Report explains that an air quality diffusion tube survey along the A23 Brighton Road and in the vicinity of the Hazelwick roundabout is ongoing. There are no other references to the need for additional project-specific monitoring to inform the determination of baseline conditions. The ES should clearly set out all studies and surveys undertaken to inform the final baseline information, including the timing of any site visits and how/if professional judgement has been applied.	details of relevant monitoring carried out for the Project, including sites along the A23 and near to Hazelwick Roundabout. The results were used to inform the baseline conditions reported in the PEIR. Relevant information is presented in Section 13.6 and in Appendix 13.6.1.
The ES should clearly set out assumptions made around predictions of future background pollutant concentrations, including details as to how the predicted growth of passenger throughput in the absence of the Proposed Development ("scenario 1" as presented in Chapter 3 of the Scoping Report) influences the future baseline.	The PEIR contains details of how future background concentrations have been assessed and how predicted growth has influenced the future baseline.
The Applicant proposes to predict pollutant concentrations across a gridded area "likely to be 11 km by 10 km centred on the airport", (subject to amendment if required to ensure all significant effects are captured), and including discrete sensitive human and ecological receptors which may be beyond the contour grid area. This process should be clearly set out in the ES, including reasons why discrete receptors outside of any defined contour grid area need not warrant an extension to that grid area. The ES should have regard to the Air Navigation Guidance 2017 with respect to the parameters for assessment of aviation emissions on local air quality. The Inspectorate agrees that the study area is not appropriately defined by an 'arbitrary limit' and instead should be defined by the area over which significant air quality effects could arise.	The study area for the assessment has been defined by screening the changes in traffic flows due to the Project within the Traffic Reliability Area (TRA)[2] in addition to the roads assessed within a 11 km by 10 km domain centred on the airport (Figure 13.4.1). Therefore, discrete receptors (human and ecological) outside of the 11 km by 10 km domain have been assessed. Further methodology details of the roads and receptors included in the assessment are described in Section 13.4.6 with all receptors presented in Appendix 13.6.2.
The ES should explain how modelled outputs across gridded areas (or at modelled receptors) will be considered together such that combined concentrations associated with road traffic and aircraft emissions can be predicted (where applicable).	The PEIR has included model outputs at discrete sensitive receptors within both the 11 km by 10 km domain and wider study area outside of this domain. The approach for the PEIR is detailed in Appendix 13.4.1. The ES will further include gridded model outputs for the 11 km by 10 km domain.

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

Details	How/Where Addressed in PEIR
Be aware of the recommendations of the Government's air quality expert group publication 'Ultrafine Particles (UFP) in the UK' report, and the Government's draft aviation 2050 strategy around UFP and take into account emerging policy and legislative change in this regard.	The ES will consider emerging policy and legislation (where appropriate) at the time of writing. There are no specific emission factors to allow quantitative assessment of ultrafine particles at present, but they are included within the $PM_{2.5}$ size fraction which will be assessed in the ES and are taken into account in the PEIR (both in the chapter and appendix).
The sensitive receptors in the ES should include airport passengers, users of associated facilities (eg hotels and offices) and employees where relevant.	Sensitive receptors are defined as per Environmental Protection UK (EPUK)/IAQM guidance (Moorcroft and Barrowcliffe. *et al.*, 2017) and Defra Technical Guidance (TG16) (Defra, 2021b) and represent best practice for an air quality assessment. Further details are provided in this chapter (13.4.10 to 13.4.22) with all modelled sensitive receptors presented in Appendix 13.6.2.
As part of the detailed emissions inventory, the ES should present the anticipated level of aircraft emissions having regard to air traffic projections at each of the assessment scenario intervals. Any assumptions made in respect to fleet composition, engine standards, and growth rates (or ranges) should be explained and justified. The Applicant explains that the modelling "can allow for variations of each of the emission sources with time", and the ES should explain how these variations could affect the assessment of significant effects though sensitivity analysis or otherwise. These assumptions should also be framed in the context of the "key parameters" as set out in table 5.4.1 (in particular around additional passenger air transport movements).	Full details of the emissions inventory will be provided in the ES. Details on the methodology and assumptions for the emissions inventory for this PEIR assessment are presented in Appendix 13.4.1. The assessment has been based on the best estimate of emissions and worst case assumptions where applicable.
The potential need for, specification and location of water treatment works is not yet defined (as set out in paragraphs 5.2.58 – 5.2.60). The air quality assessment should address the potential impacts of any proposed treatment works on nearby sensitive receptors in accordance with the IAQM odour guidance, and consider the need for mitigation measures where appropriate. In accordance with that guidance, the ES should set out how a multi-tool approach has been applied to determine the need for impact screening, sampling and dispersion modelling in order to assess effects at relevant sensitive receptors.	It is proposed that three new pumping stations are provided that will connect to existing infrastructure (further described in Chapter 5 Project Description). Therefore, no detailed odour assessment is required for the construction of the Project.

Details	How/Where Addressed in PEIR
The ES should clearly set out the criteria against which the need for operational mitigation measures will be determined, and the suite of measures that have been considered. In doing so, the Applicant should demonstrate regard given to the Sussex Air Partnership's Air Quality and Emissions Mitigation Guidance for Sussex (2021) in assessing air quality impacts and deriving necessary mitigation measures as well as the Defra 'Air quality damage cost guidance'.	The PEIR has and the ES will detail the criteria that determine the need for mitigation. Full details of the construction mitigation measures proposed are provided in Appendix 13.8.1. The Sussex guidance has been considered in this assessment with the outcome and mitigation proposed stated in Section 13.9 of this chapter.

13.3.4 Key issues raised during consultation and engagement with interested parties specific to air quality are listed in Table 13.3.2, together with details of how these issues have been addressed in the PEIR.

Table 13.3.2: Summary of Consultation

Consultee	Date	Details	How/Where Addressed in PEIR
Local Planning Authority Air Quality, Carbon and Climate Change Topic Working Group: Local Planning Authorities (Crawley Borough Council, Reigate and Banstead Borough Council, Mole Valley District Council, West Sussex County Council, Surrey County Council, Horsham District Council, Mid Sussex District Council, East Sussex County Council and Kent County Council)	28.08.19	Discussion on topics such as: ▪ modelling of certain sensitive receptors such as Ashdown Forest; ▪ scenario years; ▪ strategic traffic model being used for the ES; ▪ study area extent; ▪ odour assessment; ▪ source apportionment; and ▪ height of modelling aircraft emissions.	No changes to scope identified.
Wider stakeholders and Local Planning Authorities Technical Officer Group (Brighton and Hove City Council, Wealden District Council, Sevenoaks District Council, Waverley District Council, London Borough of Croydon, London Borough of Sutton, Royal Borough of Windsor and Maidenhead, Greater London Authority, Transport for London, Highways England, Historic England, Network Rail,	03.09.19	Presentations on: ▪ scope of assessment and methodology; ▪ scenarios years; ▪ study area extent; and ▪ sensitive receptors.	No changes to scope identified.

Consultee	Date	Details	How/Where Addressed in PEIR
Charlwood Parish Council, Horley Town Council, Coast to Capital LEP)			
Local Planning Authority Air Quality, Carbon and Climate Change Topic Working Group: Local Planning Authorities (Crawley Borough Council, Reigate and Banstead Borough Council, Mole Valley District Council, West Sussex County Council, Surrey County Council, Horsham District Council, Mid Sussex District Council	27.01.20	Project update including: ▪ air traffic forecasts; ▪ proposed developments; ▪ construction; and ▪ DCO timeline. Presentations on Emerging findings of preliminary impact assessment work: ▪ Air Quality; ▪ Carbon and Climate Change; and ▪ Major Accidents and Disasters.	No changes to scope identified
Crawley Borough Council and Reigate & Banstead Borough Council	25.03.21	Request for records of odour complaints in the local planning authority area for the past 5 years.	Qualitative assessment of odour complaints in Section 13.6.
Multiple local planning authorities within the study area	January to June 2021	Requests for latest year of monitoring data in the local planning authority area.	Inclusion in baseline desk study.

13.4. Assessment Methodology

Relevant Guidance

13.4.1 The following guidance documents relevant to air quality have been considered in the assessment process:

- Local Air Quality Management Technical Guidance (TG16) (Defra, 2021b).
- Guidance on the assessment of dust from demolition and construction (Holman *et al.*, 2014).
- Guidance on Monitoring in the Vicinity of Demolition and Construction Sites (Institute of Air Quality Management, 2018).
- Guidance on the assessment of odour for planning (Bull *et al.*, 2018).
- Land-Use Planning and Development Control: Planning for Air Quality (Moorcroft and Barrowcliffe. *et al.*, 2017).
- A guide to the assessment of air quality impacts on designated nature conservation sites (Holman *et al.*, 2020).
- Airport Air Quality Manual (International Civil Aviation Organization (ICAO), 2020).
- Project for the Sustainable Development of Heathrow (Department for Transport, 2006).

- Natural England's approach to advising competent authorities on the assessment of road traffic emissions under the Habitats Regulations (Natural England, 2018).
- Air quality and emissions mitigation guidance for Sussex (Sussex-Air, 202).

Scope of the Assessment

13.4.2 The scope of this PEIR has been developed in consultation with relevant statutory and non-statutory consultees as detailed in Table 13.3.1 and Table 13.3.2.

13.4.3 Taking into account the scoping and consultation process, Table 13.4.1 summarises the issues considered as part of this assessment.

Table 13.4.1: Issues Considered in the Assessment

Activity	Potential Effects
Construction Phase (including Demolition): Air Quality	
Construction and demolition activities, including upgraded highway junctions, earthworks, land preparation, construction sites and airside development	Dust generation causing annoyance due to dust soiling, human health impacts due to increased PM_{10} concentrations and harm to ecological receptors.
	Emissions from construction vehicles and non-road mobile machinery causing human health impacts due to increased NOx, PM_{10} and $PM_{2.5}$ concentrations.
Construction vehicle movements using the public highway network	Emissions from construction road traffic causing human health impacts due to increased NOx, PM_{10} and $PM_{2.5}$ concentrations, and harm to ecological receptors due to increased NOx concentrations.
Operational Phase: Air Quality	
Use of Airport including aircraft, road traffic and aircraft plant (and including upgraded highway junctions)	Emissions from road traffic causing human health impacts due to increased NOx, PM_{10} and $PM_{2.5}$ concentrations, and harm to ecological receptors due to increased NOx concentrations, nitrogen and acid deposition.
	Aircraft emissions causing human health impacts due to increased NOx, PM_{10} and $PM_{2.5}$ concentrations, and harm to ecological receptors due to increased NOx concentrations and nitrogen deposition.
	Emissions from airport operations/combustion plant causing human health impacts due to increased NOx, PM_{10} and $PM_{2.5}$ concentrations, and harm to ecological receptors due to increased NOx concentrations and nitrogen deposition.
	Increased emissions of odours from operations (eg aircraft fuel, other airport operations/plant) causing annoyance.

13.4.4 Effects which are not considered likely to be significant have been scoped out of the assessment. A summary of the effects scoped out are presented in Table 13.4.2.

Table 13.4.2: Effects Scoped Out of the Assessment

Effect	Justification
Pollutants that are listed in the Air Quality Standards Regulations 2010 (amended in 2016) other than NOx, NO_2, PM_{10} and $PM_{2.5}$ have been scoped out of the air quality assessment.	The Defra TG16 document notes that the only relevant pollutants for road traffic and airports are NO_2 and particulate matter (Defra, 2021b). Emissions of other regulated pollutants are very unlikely to be significant and concentrations of these pollutants have not been identified in the local planning authority review and assessments as likely to exceed their respective air quality standards.
Assessment of odour emissions during construction.	It is not anticipated that any odorous materials will be excavated or used during the construction phase therefore this has not been assessed in the PEIR. This will be verified in the ES following any updates of the contaminated land assessment. Any emissions of odorous materials would be controlled through the CoCP, such that they would not have a significant effect on amenity.
Impacts from jettisoning of fuel from aircraft.	The jettisoning of fuel from aircraft is only undertaken in emergency situations when an aircraft is required to undertake an emergency landing and jettisoning of fuel will usually occur over water and at high altitude in order to vaporise the fuel and facilitate dispersion. These events are very infrequent, and it is not considered that there would be any potential significant effects from this activity. This approach has been agreed through the scoping process (Table 13.3.1).

Study Area

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

13.4.6 The study area for the assessment of operational emissions has been defined by the screening of changes in traffic data due to the Project within the TRA in addition to a 11 km by 10 km domain centred on the airport (Figure 13.4.1). The Affected Road Network (ARN) comprised of traffic links that exceeded the EPUK/IAQM guidance screening criteria (Moorcroft and Barrowcliffe. *et al*., 2017). Sensitive receptors were assessed when within 200 metres of the ARN. Additional roads within 200 metres of the sensitive receptors were also added in the assessment to ensure all relevant emissions were accounted for. Aircraft emissions have been assessed for the landing and take-off (LTO) cycle up to 3,000 ft (approximately 915 metres) in height as defined by the ICAO.

13.4.7 In this assessment the term 'wider study area' has been used to refer to the 11 km by 10 km domain plus the modelled roads (that exceeded the EPUK/IAQM guidance screening criteria) outside the domain for each assessment scenario.

13.4.8 Traffic data from the Simulation and Assignment of Traffic to Urban Road Networks (SATURN) transport model were used to calculate construction and operational traffic emissions for the Project. All roads have been modelled within the 11 km by 10 km domain. Outside this domain, as stated in Section 13.4.6, changes in traffic flows have been screened for the need of detailed assessment. The study area is therefore different for each assessment scenario depending on the screening.

13.4.9 Pollutant concentrations have been predicted at discrete sensitive human and ecological receptors within the 11 km by 10 km domain and along the modelled roads outside this domain.

Identification of Sensitive Receptors

13.4.10 Sensitive receptors are defined as those locations where members of the public might be regularly exposed, such as residential properties, schools, hospitals and care homes. AddressBase Plus data (Ordnance Survey, 2019) were obtained from Ordnance Survey (OS) to identify sensitive receptors within the 10 km by 11 km domain. This is a geospatial dataset that includes local authority and Royal Mail addresses, multi-occupancy addresses, objects without postal addresses and OS MasterMap Topography Layer and Integrated Transport Network references. Within the wider study area, receptors were also selected using satellite imagery and databases of school, care home and National Health Service (NHS) trust site location information (UK Government, 2021) (NHS England, 2021).

13.4.11 Pollutant concentrations have been predicted at the discrete sensitive human receptors within the 11 km by 10 km domain for all assessment scenarios. A total of 716 representative sensitive human receptors were selected for inclusion within the grid domain (63 schools/nurseries, 74 hospitals/care homes, 487 residential dwellings, two community centres close to modelled pollution sources in the study area and 90 committed developments).

13.4.12 Pollutant concentrations have been predicted at discrete sensitive human receptors along the road network in addition to those within the 11 km by 10 km domain for each of the assessment scenarios. For the 2024 construction phase for airfield works scenario an additional 345 sensitive human receptors were included in the assessment. For the 2029 construction phase for surface access improvements scenario an additional 397 sensitive human receptors were included. For the 2029 and 2032 operational scenarios an additional 318 and 742 sensitive human receptors were included respectively. The number of receptors included for each assessment scenario varies depending on the extent of the screened in roads in the wider study area.

13.4.13 The sensitive receptors included in the model have been selected as representative of worst case (most sensitive) locations along modelled roads, junctions, or airport sources.

13.4.14 Sensitive ecological receptors are defined as those sites whose features have been designated as sensitive to air pollutants, either directly or indirectly. This includes statutory designations such as Sites of Special Scientific Interest (SSSI), Special Protection Areas (SPAs), Special Areas of Conservation (SACs), National Nature Reserves (NNR), Local Nature Reserves (LNRs) as well as non-statutory designations such as ancient woodlands. The air quality assessment has included both statutory and non-statutory sites in the wider study area.

13.4.15 Vegetation can be adversely affected in the presence of sufficient levels of NOx. Deposition of pollutants derived from NOx emissions contribute to acidification and/or eutrophication of sensitive habitats leading to loss of biodiversity or changes to species composition. The likelihood

of such effects occurring is determined by pollutant thresholds known as 'critical loads' which are defined by the United Nations Economic Commission for Europe (UNECE, 2015) as:

"a quantitative estimate of exposure to one or more pollutants below which significant harmful effects on specified sensitive elements of the environment do not occur according to present knowledge."

13.4.16 It is important to distinguish between the critical load and the air quality standard (or critical level) for NOx, as defined in Section 13.2. The critical load relates to the quantity of pollutant (in this case nitrogen) deposited from air to the ground, whereas the critical level (air quality standard) is the gaseous concentration of a pollutant in the air. Critical loads specific to a particular ecological receptor site or particular habitats within them are provided by the Air Pollution Information System (APIS) (Centre for Ecology and Hydrology, 2021).

13.4.17 Further details and the locations of human and ecological sensitive receptors are presented in Appendix 13.6.2.

Methodology for Baseline Studies

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

Desk Study

13.4.19 Existing or baseline ambient air quality refers to the concentrations of relevant substances that are already present in the environment. These are present from various sources, such as industrial processes, commercial and domestic activities, traffic and natural sources.

13.4.20 A desk-based review was undertaken using the following data sources to determine baseline conditions for air quality in this assessment:

- the UK Air Information Resource website (Defra, 2021c);
- data from monitoring surveys carried out for the Project and by the local planning authorities (Appendix 13.6.1);
- the Pollution Inventory website (Environment Agency (EA), 2021);
- Geographical Information Systems (GIS) boundaries of designated ecological sites (Natural England, 2021);
- background UK emissions data (National Atmospheric Emissions Inventory (NAEI), 2021); and
- the APIS website (Centre for Ecology and Hydrology, 2021).

Site-Specific Surveys

13.4.21 A monitoring survey has been undertaken by Arup to supplement the monitoring surveys carried out by Reigate and Banstead Borough Council and Crawley Borough Council. The survey was undertaken between June 2016 and March 2020. A passive monitoring method was used for measuring ambient concentrations of NO_2 with diffusion tubes. Measurements were taken on a monthly basis at key areas of concern around the airport. Further information on the measurements and the site locations are provided in Appendix 13.6.1.

Assessment Criteria and Assignment of Significance

13.4.22 The overall approach to the air quality assessment comprises:

- a review of the existing and future local air quality conditions at and around the airport;
- an assessment of the potential changes in air quality arising from the construction activities of the Project;
- an assessment of the potential changes in air quality arising from the operation of the Project; and
- the formulation of any additional mitigation measures, where necessary, to ensure any potential adverse effects on air quality are minimised.

13.4.23 Emissions of NOx, PM_{10} and $PM_{2.5}$ have been calculated using methods described in the following sections for each pollution source. The following sections also detail the method for calculating pollutant concentrations and nitrogen deposition. Full details of the methodology, including relevant assumptions and limitations can be found in Appendix 13.4.1.

Assessment Scenarios

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

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

13.4.25 Chapter 12: Traffic & Transport also includes an assessment for 2047. However, air quality is expected to improve in the future and current tools include predictions only up to 2030. Any predictions for 2047 would be highly uncertain. Air quality in 2047 is expected to be significantly better than current conditions therefore this has not been included in the assessment.

13.4.26 The 2018 current baseline scenario provides information on the existing air quality conditions in the study area and provides the basis for verifying the air quality model outputs against local measurements. The year 2018 was selected for the latest available transport information, (2018 was selected due to the availability of baseline information and the impact of Covid-19 on traffic flows, more detail on this is provided in Chapter 12: Traffic and Transport).

13.4.27 The 2024-2029 construction scenario for the airfield works has assumed the peak construction traffic flows applied to the first year of construction (2024) as a worst case. In reality, the peak year of construction is closer to the end of the construction period. However, using 2024 emissions and backgrounds will provide a worst case assessment in terms of air quality impacts since emissions and background concentrations are anticipated to improve in future years. This scenario has focussed on the effects of road traffic emissions and the airport contribution has been assumed to be the same as in the 2029 assessment year scenario.

13.4.28 The 2029 assessment year represents the first full year of the Project opening. The 2032 assessment year represents an interim assessment following completion of the surface access improvements and the majority of the airfield works. For the 2032 scenario, 2030 background pollutant concentrations and road vehicle emissions have been used as the latest available data from Defra (no 2032 data are available) (Defra, 2021c).

13.4.29 The 2029-2032 construction scenario for the surface access improvements has assumed the peak construction traffic flows applied to the first year of this phase (2029) as a worst case since emissions and background concentrations are anticipated to improve in future years. During this construction period there will be an overlap with the operation of the Project. This scenario has focussed on the effects of road traffic emissions and the airport contribution has been assumed to be the same as in the 2029 (first full year of the Project opening) assessment year scenario.

13.4.30 The design year of the Project is 2038. It is anticipated that there will be improvements in background air quality and vehicle emissions in the future and current tools include predictions only up to 2030, therefore the 2032 assessment year represents the worst case for air quality. The 2038 design year has been assessed for the PEIR only in terms of aircraft emissions and not for road vehicle emissions. As only aircraft emissions were calculated for 2038 no pollutant concentrations were predicted for this scenario. Emissions and backgrounds are expected to reduce in the future and therefore 2032 is likely a worst case scenario for the air quality assessment.

Construction Assessment Methodology

Construction Dust Assessment

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

13.4.32 An ‘impact’ is described as a change in pollutant concentrations or dust deposition, while an ‘effect’ is described as the consequence of an impact. The main impacts that may arise during demolition and construction of the Project are:

- dust deposition, resulting in the soiling of surfaces;
- visible dust plumes;
- elevated PM_{10} concentrations as a result of dust generating activities on-site; and
- an increase in NO_2 and PM_{10} concentrations due to exhaust emissions from non-road mobile machinery and vehicles accessing the site of the Project.

13.4.33 The IAQM guidance considers the potential for dust emissions from activities such as demolition of existing structures, earthworks, construction of new structures and trackout (Holman *et al.*, 2014). Earthworks refer to the processes of soil stripping, ground levelling, excavation and land capping, while trackout is the transport of dust and dirt from the site onto the public road network where it may be deposited and then re-suspended by vehicles using the network. This arises when vehicles leave the site with dusty materials, which may then spill onto the road, or when they travel over muddy ground on-site and then transfer dust and dirt onto the road network.

13.4.34 For each of these dust-generating activities, the guidance considers three separate effects:

- annoyance due to dust soiling;
- harm to ecological receptors; and
- the risk of health effects due to a significant increase in PM_{10} exposure.

13.4.35 The assessment of construction dust has been undertaken using a five step process. Following the screening for the need of the assessment (step 1) this involves the identification of the magnitude of dust emission and sensitivity of the surrounding area (step 2); the determination of the site-specific mitigation (step 3); identification of any significant effects (step 4); and finally, the reporting of the assessment (step 5). The full methodology for the assessment of construction dust emissions, including tables to describe the sensitivity and magnitude, is detailed in Appendix 13.4.1.

Construction Traffic Assessment

13.4.36 Changes to air pollutant concentrations as a result of additional construction vehicles on the highway network have been predicted using the Atmospheric Dispersion Modelling System (ADMS) ADMS-Airport (version 5.0.0.1).

13.4.37 The two construction assessment scenarios are as presented in paragraphs 13.4.27 and 13.4.28 in this section. The peak construction traffic data for each of the scenarios have been used for the assessment, including changes in traffic patterns in the area. The peak in construction activity is close to 2029 and therefore both construction traffic scenarios use 2029 aircraft-related and car park emissions for the with and without Project scenarios.

13.4.38 Full details of the modelling methodology and calculations of emissions, and any assumptions and limitations are provided in Appendix 13.4.1 with the assessment of significance as per paragraph 13.4.47.

Operational Assessment Methodology

13.4.39 A review of sources and emissions associated with the existing baseline conditions and the operation of the Project have been carried out. Data have been gathered for the following pollution sources for the compilation of an emission inventory:

- aircraft main engines in the LTO phase both at ground level and at height;
- aircraft auxiliary power units (APUs);
- ground support equipment (GSE), namely vehicles operating airside which are associated with aircraft turn-around and runway maintenance;
- other airport sources, such as heating plant, fire training ground, aircraft engine testing and brake & tyre wear;
- road vehicles on the local highway network (split into airport and non-airport related emissions); and
- vehicles at car parks.

13.4.40 The ADMS-Airport dispersion model has been used for the assessment of operational emissions to predict annual mean concentrations for the pollutants of concern at sensitive human and ecological receptors. The performance of the air quality model has been verified against local air quality monitoring data. The methodology for the assessment of impacts and significance of effects at sensitive human and ecological receptors is outlined in the paragraphs below.

13.4.41 Full details of the modelling methodology and calculations of emissions, and any assumptions and limitations are provided in Appendix 13.4.1 with the assessment of significance as per paragraph 13.4.465 and 13.4.476.

Human Receptors

13.4.42 For the assessment of impacts and significance of effects at sensitive human receptors (including residents living at committed developments), the approach described in the EPUK/IAQM guidance has been used (Moorcroft and Barrowcliffe. *et al.*, 2017). This is best practice for undertaking air quality assessments in the UK and has been used for the assessment of other major airport developments.

Receptor Sensitivity/Value

13.4.43 All assessed human receptors have been classified as high sensitivity for the construction and operational assessments.

Magnitude of Impact

13.4.44 The magnitude of impact at each of the receptors has been calculated by taking into account the percentage change in predicted concentrations as a result of the Project and the predicted concentrations relative to the air quality standard.

13.4.45 In accordance with the EPUK/IAQM guidance (Moorcroft and Barrowcliffe. *et al.*, 2017) the impact descriptors used in this assessment (for both construction and operation) are set out in Table 13.4.3. Where the Project is predicted to considerably increase concentrations of pollutants then an adverse impact would be anticipated and where the Project is predicted to considerably decrease concentrations a beneficial impact would be anticipated.

Table 13.4.3: Assessment Matrix

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

Significance of Effect

13.4.46 The following considerations have been made during the evaluation of significance for air quality:

- the predicted change in pollutant concentration as a result of the Project;
- the level of predicted pollutant concentration as a result of the Project in relation to the air quality standards;
- the existing and future air quality in the absence of the Project;
- the extent of current and future population exposure to the impacts; and
- the influence and validity of any assumptions adopted when undertaking the prediction of impacts.

13.4.47 These factors have been taken into account to determine whether effects are likely to be significant. For this assessment, moderate and substantial impacts have been considered to result in a significant effect, while negligible and slight impacts have been considered to not result in a significant effect.

Ecological Receptors

13.4.48 The methodology for this assessment follows the IAQM and Natural England guidance documents (Holman *et al.*, 2020) (Natural England, 2018).

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

13.4.50 For ecological sites, where NOx concentrations are predicted to be below the air quality standard, no significant effects would be anticipated. For those sites where NOx concentrations are predicted to be above the air quality standard, then a judgment of significance, by an ecologist, can be made once an assessment of nitrogen deposition has been undertaken for the site.

13.4.51 A further assessment has therefore been undertaken for ecological receptors to predict the change in nitrogen deposition as a result of the Project for those receptors at which NOx concentrations are above the air quality standard of 30 µg/m^3. Nitrogen deposition rates and information on sensitive habitats for the designated sites have been taken from the most recent data on the APIS website (Centre for Ecology and Hydrology, 2021) in consultation with the Project ecologists.

13.4.52 An assessment of nitrogen deposition has been undertaken for the four sites included in the HRA, even when NO_x concentrations are predicted to be below the air quality standard of 30µg/m^3. These ecological sites were Ashdown Forest SPA/SAC, Thames Basin Heaths (M25 site) SPA, Thames Basin Heaths (M3 site) SPA/SAC and Mole Gap to Reigate Escarpment SAC). Further details and the assessment methodology are included in Appendix 13.4.1.

13.4.53 For an assessment of nitrogen deposition, NOx has first been converted to NO_2 using the Clapp and Jenkin (2001) approach, and then the nitrogen deposition rate has been calculated as follows:

- NO_2 concentrations (µg/m^3) were multiplied by the relevant deposition velocity (0.0015 m/s for grassland and 0.003 m/s for forest habitats); and
- the resulting value (µg NO_2/m^2/s) was converted to kg N/ha/yr using a factor of 96 (ie converting from NO_2 to nitrogen using the molecular mass).

13.4.54 Where the long-term process contribution (PC) (the predicted change in concentrations of nitrogen deposition due to the Project) is predicted to be less than 1 per cent of the long-term environmental standard (this is the critical load in the case of assessing nitrogen deposition for ecological sites) then no significant effects would be anticipated (Holman *et al.*, 2020) (Natural England, 2018).

13.4.55 These calculations were carried out for the baseline and future year assessment scenarios at sensitive receptor locations at the designated ecological sites in the study area. The resulting change in nitrogen deposition due to the Project was compared against the lower critical level for each ecological site as a precautionary measure.

13.4.56 Sulphur emissions from road vehicles, aircraft engines and other airport sources would not significantly affect the acidity at the ecological sites, therefore acidity has not been assessed with regards to sulphur. Acidity from nitrogen has been taken into account in the four sites considered in the HRA. The short-term guideline for 24-hour NOx concentrations has also not been assessed, since the long-term critical loads are the key determinants of impact on the ecological sites.

13.5. Assumptions and Limitations of the Assessment

13.5.1 In June 2021 GAL published its updated Decade of Change (Sustainability) Strategy for the airport (Gatwick Airport Limited, 2021). Building on its previous Decade of Change (2010- 2020) Strategy, this new 10-year strategy sets out policies and goals for the period up to 2030, including further reductions in airport and surface access emissions. Information underpinning the air quality modelling results reported in this PEIR chapter pre-date the updated Strategy and therefore do not reflect GAL's latest goals to reduce emissions in respect of energy plant and heating demand. The ES will provide an updated air quality assessment taking into account the latest Decade of Change Strategy.

13.5.2 The traffic data available for the PEIR was defined by the TRA provided by the transport consultants (Chapter 12: Traffic and Transport).

13.5.3 Although the potential effects of NOx derived nitrogen deposition are an established basis for assessment, there is no guidance currently on how to model the potential effects of ammonia derived deposition. Discussions are ongoing with Natural England and Highways England, on this issue and, if necessary, how to appropriately calculate ammonia emissions and any other relevant input assumptions to include in the assessment. The assessment for the PEIR has focussed on the potential effects of NOx derived nitrogen deposition only for ecological sites. However, pending these further discussions with key stakeholders, the assessment may be refined and updated where required to consider ammonia as part of the ES in support of the DCO application.

13.5.4 For the PEIR, pollutant concentrations have been predicted at discrete sensitive human and ecological receptors within the study area. Contour mapping of pollutant concentrations for the 11 km by 10 km study area will be included in the ES.

13.5.5 This assessment has been based on estimates of how the aircraft fleet will transition over time, based on assumptions around airlines' fleet procurement programmes and business models. The 'central case' used in this assessment is based on what is considered today to be the most likely rate of fleet transition. Any implications of a slower transition fleet will be reviewed for the ES.

13.5.6 If further information identifies the potential for excavation of any odorous materials during construction then an odour assessment will be undertaken as part of the ES.

13.5.7 No detailed assessment of construction plant has been undertaken. It is assumed that best practice measures and low emission plant will be used during construction to minimise any potential air quality effects and would be implemented through the CoCP.

13.5.8 Full details of the assumptions and limitations of the air quality assessment are provided in Appendix 13.4.1. The approach taken is considered to provide a robust assessment on the basis of the data available at the time of the PEIR.

13.6. Baseline Environment

Current Baseline Conditions

Local Air Quality Management

13.6.1 There are two AQMAs (declared by Crawley Borough Council and Reigate and Banstead Borough Council in their administrative areas) within the 11 km by 10 km domain centred on the airport.

13.6.2 The Horley AQMA (amended to AQMA No.3 in 2003) was declared by Reigate and Banstead Borough Council in 2002 and encompasses an area of the south west quadrant of Horley to the north of the airport, including Riverside Garden Park. The Hazelwick AQMA, to the south of the airport, was declared by Crawley Borough Council in 2015 and encompasses the Hazelwick roundabout and areas along the adjoining roads; the A2011 Crawley Avenue, Hazelwick Avenue, the A2004 Northgate Avenue and Gatwick Road. The Hazelwick AQMA is currently in the process of being extended to "*include the Three Bridges area, forming a single extended 'Crawley AQMA*" (Crawley, 2021). This will add an additional area onto the south eastern 'arm' of the current AQMA. Consultation has ended and the extension recommendation has been approved.

13.6.3 Both AQMAs have been designated for exceedances of the annual mean NO_2 air quality standard and their locations are presented in Figure 13.4.1. Other AQMAs in the wider study area were also considered in this air quality assessment (total of 21 AQMAs in the wider study area). The full list of receptor results in the AQMAs are detailed in Appendix 13.9.1.

Local Monitoring Data

13.6.4 There are five continuous monitoring sites currently in operation within the 11 km by 10 km domain centred on Gatwick Airport and a wide network of diffusion tubes operated by the local planning authorities (Figure 13.6.1). The locations of the continuous monitoring sites are mainly urban background sites and there is one airport site (LGW3) at the eastern end of the main runway. Latest available monitoring data for the continuous monitors over a five-year period from 2015 to 2019 are presented in Table 13.6.1. It can be observed that annual mean NO_2 concentrations over this period have consistently been well below the air quality standard of 40 µg/m^3 at these sites. There were also no exceedances of the 1-hour mean NO_2 standard of 200 µg/m^3 at any of these sites.

13.6.5 Diffusion tube measurements of NO_2 concentrations at roadside locations operated by the local authorities along the A23 Brighton Road and around Hazelwick roundabout have exceeded the air quality standard over the past few years. Exceedances of the NO_2 air quality standard of 40 µg/m^3 were also recorded in 2018 during the air quality monitoring survey undertaken at these locations on behalf of GAL. Full details of the diffusion tube monitoring survey results are presented in Appendix 13.6.1.

13.6.6 Measurements of PM_{10} concentrations are undertaken at the RG1, CA2 and LGW3 continuous monitoring sites near the airport. Measurements of PM_{10} have been well below the air quality

standard (annual mean) of 40 µg/m^3 at these sites over the period (Table 13.6.1) and there were also no exceedances of the 24-hour mean standard of 50 µg/m^3 at any of the sites. No monitoring of $PM_{2.5}$ concentrations is undertaken in the area.

Table 13.6.1: Continuous Monitoring Data

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

* data capture below 90%

** The RG2 Horley South East monitoring site closed in 2017. It was replaced by the RG6 Horley South East site which was installed at the end of 2016 approximately 30 metres away from the RG2 site.

Background Concentrations

13.6.7 The Defra website (Defra, 2021c) includes estimated background air pollution concentrations for NOx, PM_{10} and $PM_{2.5}$ for each 1 km by 1 km OS grid square in the UK. The data are available for a reference year of 2018 and forecast annually until 2030. Background pollutant concentrations for each year of assessment have been obtained for the grid squares in the study area. Background concentrations for 2030 (latest year of data available) have been used for the interim assessment year (2032).

13.6.8 The air quality assessment has included major roads and aircraft sources explicitly in the model. Therefore, background concentrations attributed to these sources have been removed from the total background concentrations to avoid double-counting. The sectors removed from the background concentrations are the in-squares and out-squares of motorways, trunk A roads, primary A roads and aircraft within the 11 km by 10 km domain. In the wider study area only in-squares of motorways, trunk A roads and primary A roads were removed. In-squares refer to the contribution of emissions from within the specified 1 km by 1 km grid square and out-squares refer to contribution of emissions from outside of the specified 1 km by 1 km grid square. The Defra background concentrations used for the modelled receptors are presented in Appendix 13.6.2.

Ecological Receptors

13.6.9 The following statutory and non-statutory designated ecological sites across the study area have been included in this assessment:

- nine SSSIs: Banstead Downs, Buchan Hill Ponds, Epsom and Ashtead Commons, Glover's Wood, Ockham and Wisley Commons, Reigate Heath, Riddlesdown, Titsey Woods, Westerham Wood;
- five LNRs: Edolph's Copse, Grattons Park, Ockham and Wisley, Old Lodge Nutley, Willoughby Fields;
- the Mole Gap to Reigate Escarpment SAC;
- the Ashdown Forest SPA/SAC/SSSI;
- the Thames Basin Heaths SPA;
- the Thursley, Ash, Pirbright and Chobham SAC; and
- several ancient woodland sites.

13.6.10 As per the human receptors, the sensitive ecological receptor locations assessed vary for each assessment scenario, depending on the extent of the modelled traffic network. Baseline conditions for the ecological site closest to the airport (Glover's Wood SSSI) and the four sites for which HRAs were undertaken (Ashdown Forest SPA/SAC; Thames Basin Heaths SPA; Thursley, Ash, Pirbright and Chobham SAC; and Mole Gap to Reigate Escarpment SAC) are presented in the following paragraphs with a full list of all ecological sites assessed and background concentrations for each scenario presented in Appendix 13.6.2.

13.6.11 Data for Glover's Wood SSSI were obtained from the APIS website (Centre for Ecology and Hydrology, 2021). The most sensitive habitat at this site in relation to nutrient nitrogen is broad-leaved, mixed and yew woodland. The relevant nitrogen critical load class is for *meso- and eutrophic Quercus woodland* with a lower value of 15 kg N/ha/yr. The minimum background deposition rate at this site is 25.7 kg N/ha/yr as a three-year average (2017 – 2019).

13.6.12 Data for Ashdown Forest SPA/SAC were obtained from the APIS website (Centre for Ecology and Hydrology, 2021) and confirmed with the Project ecologists. The most sensitive habitat at this site in relation to nutrient nitrogen is the heathland with a critical load of 10-20 kg N/ha/yr. The minimum background deposition rate at this site is 22.7 kg N/ha/yr as a three-year average (2017 – 2019).

13.6.13 Data for Thames Basin Heaths SPA/SAC and Thursley, Ash, Pirbright and Chobham SAC were obtained from the APIS website (Centre for Ecology and Hydrology, 2021) and confirmed with the Project ecologists. The most sensitive habitat at these sites in relation to nutrient nitrogen is the heathland with a critical load of 10-20 kg N/ha/yr. The minimum background deposition rate at is 21.6 kg N/ha/yr as a three-year average (2017 – 2019).

13.6.14 Data for Mole Gap to Reigate Escarpment SAC were obtained from the APIS website (Centre for Ecology and Hydrology, 2021) and confirmed with the Project ecologists. The most sensitive habitat at this site in relation to nutrient nitrogen is the grassland with a critical load of 15-25 kg N/ha/yr. The minimum background deposition rate at this site is 25.0 kg N/ha/yr as a three-year average (2017 – 2019).

Odour Complaints from the Past Five Years

13.6.15 Complaints of odour near airports are sometimes received in connection with oily droplets and/or fuel dumping. Fuel dumping does not occur at or near to the airport and it is therefore unlikely that this would be responsible for odour complaints. Other complaints, however, may correlate with the airport activity (eg long hold times, aircraft engine testing, refuelling) and the wind direction at the time of the complaint. Odour could arise from airport sources due to the release of vapour when tanks are being filled or, more commonly, due to unburnt hydrocarbons.

13.6.16 It is changes in odour concentration that give rise to complaints, as people can become used to a persistent level of odour, but changes in odour may occur over a short timescale and due to the turbulence in the atmosphere will not be uniform across an area. This makes odour difficult to measure in real time.

13.6.17 Data was requested from Crawley Borough Council and Reigate and Banstead Borough Council of any odour complaints received in the last five years. The following section looks qualitatively at the results.

13.6.18 Complaint information is a useful source of data to assist in assessing the odour environment of an area, however, it does have its limitations. In an EA research report (Environment Agency, 2002) it states that:

"Complaints registration provides an insight into the prevalence of a symptom of odour annoyance, not in the prevalence of the annoyance itself. There are many factors at play that determine the ease or difficulty of registering a complaint. Therefore, complaint data must be interpreted with some caution. Registered complaints are a very strong indication that odour nuisance is a reality in a specific situation. However, the absence of registered complaints does not necessarily indicate the absence of nuisance. Also, once a conflict situation develops over emissions of odour, the registering of complaints can become a tool in the fight, when residents use orchestrated complaints as a political lever to move the argument in their favour".

13.6.19 Complaints data can therefore provide an indication that there is annoyance in the community but has its limitations in determining the actual scale of odour exposure experienced and the number of people affected. In research published in a peer reviewed journal (Bull and Fromant, 2014) it was confirmed that the number of complaints received has little relationship with the level of odour exposure experienced.

13.6.20 Complaints are submitted directly to the local planning authority. There were five formal complaints received by Crawley Borough Council and 12 by Reigate and Banstead Borough Council over the period, with the latest complaints for both councils being in 2019. An informal survey between 4th December 2019 and 28th January 2020 was also undertaken by a local resident at Horley Gardens Estate (at various locations to the north of the airport).

13.6.21 There are currently no established criteria for determining how significant the number of complaints received are for a site. As the EA report notes, there are several factors that influence the number of complaints received and it is not possible to compare one site with another as factors such as exposure and the scale of population exposed will differ. The trends in the number of complaints received is harder to interpret. Research suggests that complaints increase when the profile of a site has been raised, for example when a new planning application is made

or following an incident at a site (Bull and Fromant, 2014). From the 17 formal complaints received the majority are from 2016 and 2017 suggesting greater odour problems across those two years in the local area. Four out of the five Crawley complaints specify ‘aviation/jet fuel’ or ‘kerosene’ in the complaint descriptions.

13.6.22 Data from the meteorological station at Gatwick Airport shows that the predominant wind direction at the site is from the south west. When the wind direction is from the site towards the location where the complaint was received then the airport is a possible source of the odour. If the wind direction is in the opposite direction, then it is unlikely that it is the source of the odour. Many factors affect the wind direction therefore although it is predominantly from the south west the spreading of the odour and difference between the wind direction and the direction to the complainants’ location can vary with factors such as wind speed (difference could be higher in low wind speeds where the wind direction tends to meander).

13.6.23 Outwood is stated as the location of the odour experienced in eight of the complaints across the two local planning authorities. The village is located to the north east of the airport. Additional locations stated are Picketts Lane (north/north east of the airport), Williamson Road (north east of the airport), Newdigate (north west of the airport) and Gatwick Airport railway station (on the eastern boundary of the airport). Locations to the north east of the airport could be credible sources of odour given the predominantly south westerly wind however in low wind speeds where the wind direction tends to meander this could differ and the distances of the complaints are quite far from the airport – Outwood village is approximately 5 km from the eastern boundary.

13.6.24 As locations were not provided for all odour complaints it is not possible to determine whether the airport is the likely cause of the majority of the odour complaints in the surrounding area over the past five years. Further investigation into the odour complaints will be undertaken for the ES.

Emissions Inventory

13.6.25 Table 13.6.2 presents a summary of the estimated annual NOx, PM_{10} and $PM_{2.5}$ emissions for the baseline year of 2018 for all sources across the study area.

13.6.26 Emissions have been estimated to be 6,434 t/yr for NOx, 344 t/yr for PM_{10} and 224 t/yr for $PM_{2.5}$ in the existing 2018 baseline scenario. Airport-related emissions have been estimated to be 2,030 t/yr for NOx, 48 t/yr for PM_{10} and 34 t/yr for $PM_{2.5}$. It can be observed that the largest emission source for NOx, PM_{10} and $PM_{2.5}$ is non-airport road vehicles. This is due to the large extent of the road network modelled, encompassing all roads in both the first full year of opening and interim assessment year scenarios.

Table 13.6.2: Summary of Annual Pollutant Emissions for the 2018 Baseline

Source	NOx (t/yr)	PM_{10} (t/yr)	$PM_{2.5}$ (t/yr)
Aircraft in the air			
Approach	213.6	1.8	1.8
Initial climb	276.7	1.0	1.0
Climb out	434.0	1.8	1.8
Aircraft on the ground			
Landing	1.6	<0.1	<0.1
Reverse thrust	14.3	0.2	0.2
Taxiing	123.5	2.2	2.2
Hold	64.2	1.2	1.2
Take-off	380.6	1.6	1.6
Brake & tyre wear	N/A	5.6	2.8
APUs	64.7	1.4	1.4
Engine testing	0.6	<0.1	<0.1
Ground equipment			
GSE	34.5	3.2	1.8
Fixed plant			
Fire training ground	0.1	<0.1	<0.1
Energy plant	25.8	0.2	0.2
Car parks			
Car parks	2.6	0.2	0.1
Roads			
Airport	392.9	27.8	17.9
Non-airport	4,404.1	295.9	190.3
Total (all sources)	**6,434**	**344**	**224**
Total (airport-related)	**2,030**	**48**	**34**

Future Baseline Conditions

13.6.27 The future baseline conditions have been established taking into account committed developments in the area and anticipated emissions from the airport's operation and road traffic without the Project.

Future Background Pollutant Concentrations

13.6.28 Background concentrations for the future assessment years were obtained from the Defra background maps. The Defra background maps predict pollutant concentrations up to 2030. Therefore 2030 background concentrations were used for the 2032 assessment year. This is a

conservative approach, since background concentrations are anticipated to improve in future years. The background concentrations used in the assessment are presented in Appendix 13.6.2.

Future Road Traffic Emissions

13.6.29 Road traffic emissions for the future assessment years were obtained from the Defra EFT (Defra, 2020b). The EFT includes road traffic emission factors up to 2030. Therefore, 2030 emissions were used for the 2032 assessment year. This is a conservative approach, since road traffic emissions are anticipated to improve in future years due to changes in fleet composition, the introduction of cleaner vehicles in the fleet and increased uptake of electric vehicles.

First Full Year of Opening: 2029

13.6.30 A summary of the estimated annual NOx, PM_{10} and $PM_{2.5}$ emissions for the 2029 future baseline year for all sources is presented in Table 13.6.3. Emissions have been estimated to be 2,794 t/yr for NOx, 176 t/yr for PM_{10} and 109 t/yr for $PM_{2.5}$. Airport-related emissions have been estimated to be 1,075 t/yr for NOx, 41 t/yr for PM_{10} and 28t/yr for $PM_{2.5}$.

Table 13.6.3: Summary of Annual Pollutant Emissions for the 2029 Future Baseline

Source	NOx (t/yr)	PM_{10} (t/yr)	$PM_{2.5}$ (t/yr)
Aircraft in the air			
Approach	238.0	1.8	1.8
Initial climb	342.3	1.0	1.0
Climb out	484.3	1.7	1.7
Aircraft on the ground			
Landing	1.1	<0.1	<0.1
Reverse thrust	15.8	0.2	0.2
Taxiing	139.6	2.1	2.1
Hold	86.6	1.3	1.3
Take-off	422.8	1.4	1.4
Brake & tyre wear	N/A	6.6	3.3
APUs	72.0	1.5	1.5
Engine testing	0.7	<0.1	<0.1
Ground equipment			
GSE	15.2	2.4	1.2
Fixed plant			
Fire training ground	0.1	<0.1	<0.1
Energy plant	25.2	0.2	0.2
Car parks			
Car parks	2.0	0.2	0.2

Source	NOx (t/yr)	PM_{10} (t/yr)	$PM_{2.5}$ (t/yr)
Roads			
Airport	129.5	21.2	12.6
Non-airport	818.6	134.5	80.3
Total (all sources)	**2,794**	**176**	**109**
Total (airport-related)	**1,975**	**41**	**28**

Interim Assessment Year: 2032

13.6.31 The source apportionment of the estimated annual NOx, PM_{10} and $PM_{2.5}$ emissions for the 2032 future baseline for all sources is presented in Table 13.6.4. Emissions have been estimated to be 2,854 t/yr for NOx, 217 t/yr for PM_{10} and 132 t/yr for $PM_{2.5}$. Airport-related emissions have been estimated to be 1,921 t/yr for NOx, 42 t/yr for PM_{10} and 28 t/yr for $PM_{2.5}$.

Table 13.6.4: Summary of Annual Pollutant Emissions for the 2032 Future Baseline

Source	NOx (t/yr)	PM_{10} (t/yr)	$PM_{2.5}$ (t/yr)
Aircraft in the air			
Approach	232.1	1.6	1.6
Initial climb	348.4	0.8	0.8
Climb out	455.0	1.4	1.4
Aircraft on the ground			
Landing	0.9	<0.1	<0.1
Reverse thrust	15.1	0.1	0.1
Taxiing	138.2	1.8	1.8
Hold	85.7	1.1	1.1
Take-off	409.1	1.2	1.2
Brake & tyre wear	N/A	6.8	3.4
APUs	68.2	1.5	1.5
Engine testing	0.6	<0.1	<0.1
Ground equipment			
GSE	14.0	2.3	1.2
Fixed plant			
Fire training ground	0.1	<0.1	<0.1
Energy plant	25.6	0.2	0.2
Car parks			
Car parks	2.0	0.2	0.2
Roads			

Source	NOx (t/yr)	PM_{10} (t/yr)	$PM_{2.5}$ (t/yr)
Airport	126.0	23.0	13.6
Non-airport	933.4	175.1	103.8
Total (all sources)	**2,854**	**217**	**132**
Total (airport-related)	**1,921**	**42**	**28**

Design Year: 2038

13.6.32 Table 13.6.5 presents a summary of the estimated annual NOx, PM_{10} and $PM_{2.5}$ emissions for 2038 design year future baseline scenario from all sources. Emissions have been estimated to be 2,837 t/yr for NOx, 215 t/yr for PM_{10} and 130 t/yr for $PM_{2.5}$. Airport-related emissions have been estimated to be 1,903 t/yr for NOx, 40 t/yr for PM_{10} and 26 t/yr for $PM_{2.5}$. The interim year (2032) road vehicle emissions have been included in the table as this scenario was not modelled for road traffic emissions (car parks and highway network). This is a conservative approach, since emissions are anticipated to improve in future years.

Table 13.6.5: Summary of Annual Pollutant Emissions of Aircraft Sources for the 2038 Future Baseline

Source	NOx (t/yr)	PM_{10} (t/yr)	$PM_{2.5}$ (t/yr)
Aircraft in the air			
Approach	230.5	1.3	1.3
Initial climb	348.0	0.6	0.6
Climb out	441.2	1.1	1.1
Aircraft on the ground			
Landing	0.9	<0.1	<0.1
Reverse thrust	14.7	0.1	0.1
Taxiing	138.1	1.4	1.4
Hold	85.5	0.9	0.9
Take-off	408.8	0.9	0.9
Brake & tyre wear	N/A	7.0	3.5
APUs	68.5	1.5	1.5
Engine testing	0.6	<0.1	<0.1
Ground equipment			
GSE	12.4	2.1	1.1
Fixed plant			
Fire training ground	0.1	<0.1	<0.1
Energy plant	26.2	0.2	0.2
Car parks			
Car parks	2.0	0.2	0.2

Source	NOx (t/yr)	PM_{10} (t/yr)	$PM_{2.5}$ (t/yr)
Roads			
Airport	126.0	23.0	13.6
Non-airport	933.4	175.1	103.8
Total (all sources)	**2,837**	**215**	**130**
Total (airport-related)	**1,903**	**40**	**26**

13.7. Key Project Parameters

13.7.1 The assessment has been based on the parameters identified in Chapter 5: Project Description. Table 13.7.1 identifies the key parameters relevant to this assessment. Where options exist, the maximum design scenario selected is the one having the potential to result in the greatest effect on an identified receptor or receptor group. Effects of greater adverse significance are not predicted to arise should any other option identified in Chapter 5 be taken forward in the final design of the Project.

Table 13.7.1: Maximum Design Scenarios

Potential Impact	Maximum Design Scenario	Justification
Initial Construction Phase: 2024-2029		
Construction dust soiling and human health risk/impact on ecological receptors	Construction activities for airfield alterations.	Due to the scale of the construction related activities and proximity to sensitive receptors, this would represent a maximum impact and therefore worst case.
First Full Year of Opening: 2029		
Human health and ecological impacts	Passenger Air Transport Movements (ATMs) based on forecast data. Assume surface access construction works overlap with airport operation.	The number and types of ATMs will affect aircraft and road traffic emissions which would affect air pollutant concentrations at sensitive receptors (human and ecological).
Interim Assessment Year: 2032		
Human health and ecological impacts	Passenger ATMs based on forecast data.	The number and type of ATMs will affect aircraft and road traffic emissions which would affect air pollutant concentrations at sensitive receptors (human and ecological).
Design Year: 2038		
Human health and ecological impacts	Passenger ATMs based on forecast data.	The number and type of ATMs will affect aircraft and road traffic emissions which could affect air pollutant concentrations at sensitive receptors (human and ecological).

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

13.8.1 A number of measures have been designed into the Project to reduce the potential for impacts on air quality. These are listed in Table 13.8.1.

Table 13.8.1: Mitigation and Enhancement Measures

Measures Adopted as Part of the Project	Justification
Mitigation	
Construction dust	Air quality mitigation measures are proposed to ensure best practice is followed for all on-site activities during construction. Measures from the IAQM guidance (Holman *et al.*, 2014) would be implemented through the CoCP, an outline of which is provided in Appendix 5.3.1. These measures will include the development and implementation of a Dust Management Plan (DMP), which may include controlling of other emissions, approved by the local planning authority. Dust suppression measures using water spraying, covering of dusty materials and speed limits on-site will be included. Further details of the measures for works to be carried out are provided in Appendix 13.8.1.
Construction plant and machinery	Low emission plant will be used during construction of the Project elements. The Decade of Change to 2030 document published in 2021 commits to mobile construction equipment meeting zero or ultra-low emission standards by 2030 (Gatwick Airport Limited, 2021).
Construction traffic	There will be a Construction Traffic Management Plan to reduce construction traffic and minimise impacts on the highway network. Construction traffic routing will direct traffic through the M23 Junction 9 in order to avoid any routing through the M23 Junction 10 and Hazelwick AQMA. There will also be a Construction Workforce Travel Plan with measures encouraging more sustainable travel patterns.
Operational traffic	Traffic during operation of the Project would be managed through the Airport Surface Access Strategy and the Travel Plan for Gatwick. The Airport Surface Access Strategy and Travel Plan to be submitted as part of the DCO application will set targets around increasing passenger and staff public transport mode share and set out the actions intended to deliver the same.
Airport operation	In relation to aircraft emissions on the airfield, the airport has provision for fixed electrical ground power (FEGP) on any new stands. In relation to other airport emissions, the airport is using airside electric vehicles. The Decade of Change to 2030 document published in 2021 commits to all on-airport vehicles and ground support equipment meeting zero or ultra-low emission standards by 2030 (Gatwick Airport Limited, 2021).
Combustion plant	The airport will continue improving heat generation and supply efficiencies with the replacement of older gas boilers and heat networks with the latest technology. The draft energy strategy also includes a transition of GAL's heating systems from a reliance on natural gas to electric heat pumps (using a variety of heat sources,

Measures Adopted as Part of the Project	Justification
	including air, water and sewage), retaining some of the most recent gas boilers as back-up/peaking plant.
Monitoring	
Air quality monitoring	Between June 2016 and March 2020, GAL undertook air quality monitoring using diffusion tubes for NO_2 concentrations at key areas of concern around the airport. The airport also carries out continuous monitoring at the eastern end of the main runway (LGW3 monitoring site). GAL contributes to the annual costs of the local monitoring carried out by local planning authorities and this will continue in the future. Dust monitoring during construction will also be undertaken should it be required.
Enhancement	
No air quality specific measures identified at this stage.	

13.9. Assessment of Effects

Model Verification

13.9.1 Model verification was undertaken using monitoring data for the Baseline 2018 scenario. Different adjustment factors for road traffic emissions were derived at different locations in the study area. With the application of these adjustment factors the majority of the modelled NO_2 concentrations were within ±25% of the monitored values, as defined in the Defra TG16 guidance. Details of the methodology for the model verification are presented in Appendix 13.6.1.

Initial Construction Phase: 2024-2029

Construction Dust Assessment

13.9.2 This section provides a summary of the results of the assessment of construction-related activities on air quality. The Project would require demolition, construction and earthworks, with associated trackout[3]. Separate construction dust assessments have been conducted for each element of the Project set out in Section 5.3 of Chapter 5: Project Description. The assessment has been split by Project element due to the differences in dust emission magnitudes of construction-related activities and the sensitivity of the area. Table 13.9.1 presents the Project elements and the associated dust generating activities from each element. The detailed assessment is presented in Appendix 13.9.1.

[3] Trackout is defined as "*The transport of dust and dirt from the construction/demolition site onto the public road network, where it may be deposited and then re-suspended by vehicles using the network. This arises when heavy duty vehicles (HDVs) leave the construction/demolition site with dusty materials, which may then spill onto the road, and/or when HDVs transfer dust and dirt onto the road having travelled over muddy ground on site*" (Holman *et al.*, 2014).

Table 13.9.1: Construction-related Activities Associated with each Project Element

Project Element	Construction-related Activity			
	Demolition	Earthworks	Construction	Trackout
Early works, establishment of compounds, fencing, early clearance and diversion works and re-provision of essential replacement services	Yes	Yes	Yes	No
Reconfiguration of existing maintenance airfield facilities	Yes	Yes	Yes	No
Alterations to the existing northern runway	Yes	Yes	Yes	No
Airfield works to support use of realigned northern runway	Yes	Yes	Yes	No
Pier 7	Yes	Yes	Yes	No
Extensions to North and South Terminals	Yes	Yes	Yes	No
Hotel and commercial facilities	Yes	Yes	Yes	No
Car parking	Yes	Yes	Yes	No
Surface access improvements	Yes	Yes	Yes	No
Reinstatement of final use at temporary construction compound locations	Yes	Yes	Yes	No
Flood compensation areas	No	Yes	No	No
Environmental mitigation	Yes	Yes	No	No
Access to construction	No	No	No	Yes

13.9.3 Trackout associated with the construction-related activities has only been considered for the access to contractor compounds as details of daily heavy goods vehicle (HGV) movements for each Project element are not available at this stage. Should this information be available for the ES, the assessment will be updated accordingly.

Sensitive Receptors

13.9.4 Sensitive receptors are defined as those residential properties/schools/hospitals that are likely to experience a change in pollutant concentrations and/or dust nuisance due to the construction and operation of the Project.

13.9.5 A 'high sensitivity receptor' is where "*the people or property would reasonably be expected to be present continuously*" such as dwellings and museums; a 'medium sensitivity receptor' is where "*the people or property wouldn't reasonably be expected to be present here continuously or regularly for extended periods*" such as parks and places of work; and a 'low sensitive receptor' is where "there is transient exposure, where the people or property would reasonably be expected to be present only for limited periods of time" such as footpaths and short term car parks (Holman *et al.*, 2014).

13.9.6 There are 'medium sensitivity receptors' located within 20 metres of the extensions to the North and South Terminals, car parking, surface access improvements, environmental mitigation and access to construction areas. There are also 'high sensitivity receptors' within 20 metres or 50 metres of some of the Project elements (Figure 13.9.1 to Figure 13.9.12).

13.9.7 There are no statutory designated ecological receptors within 50 metres of the Project elements. The closest statutory designated ecological receptor is Glover's Wood SSSI, located approximately 1.6 km from the Project. Therefore, the construction dust impacts on ecological receptors have not been considered further in this assessment.

Dust Emission Magnitude

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

Sensitivity of the Area

13.9.9 For the car parking and flood compensation areas Project elements, the sensitivity of the area to dust soiling has been assigned as high according to the IAQM guidance, due to the presence of more than 100 high sensitivity receptors within 50 metres of the element boundaries (Holman *et al.*, 2014).

13.9.10 For the extensions to the North and South Terminals, surface access improvements and environmental mitigation, and access to construction Project elements, the sensitivity of the area to dust soiling has been assigned as medium according to the IAQM guidance, due to the presence of more than one medium sensitivity receptor within 20 metres of the element boundaries (Holman *et al.*, 2014).

13.9.11 For all other Project elements, the sensitivity of the area to dust soiling has been assigned as low according to the IAQM guidance, due to the presence of 'low sensitivity receptors' within 20 metres of the Project element boundaries (Holman *et al.*, 2014).

13.9.12 The annual average PM_{10} concentration estimated by Defra for the grid squares of the Project elements is less than 24 µg/m^3 for 2024. Therefore, the sensitivity of the area in terms of human health has been assigned as low.

Risk of Impacts

13.9.13 Taking into consideration the dust emission magnitude and the sensitivity of the area, the dust soiling risks for all Project elements were determined (Table 13.9.2). The risk of dust soiling impacts from the Project elements for trackout is medium with a range from low to high for demolition, earthworks and construction. The risk of human health impacts ranges from low to medium for demolition and is low for earthworks, construction and trackout.

13.9.14 Further details of the results of the construction dust assessment for each of the project elements are presented in Appendix 13.9.1. Best practice mitigation measures to minimise the risk of dust soiling and human health impacts are provided in Appendix 13.8.1.

Table 13.9.2: Risk of Impacts for Dust Soiling and Human Health in the Absence of Mitigation

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

13.9.15 Following the implementation of appropriate mitigation, the effects of construction-related activities on dust soiling and human health would be negligible and the effects would therefore not be significant. The mitigation measures are applicable throughout the whole construction phase.

Construction Traffic Assessment (Construction Phase for Airfield Works)

Human Receptors

13.9.16 The modelled results for human receptors in 2024 are presented in Appendix 13.9.1 with all modelled human receptors shown in Appendix 13.6.2 (Figure 1.1.1 to Figure 1.1.4).

13.9.17 There are 52 receptors modelled in the Hazelwick AQMA. The highest annual mean NO_2 concentration is predicted to be 29.5 µg/m^3 at receptor R0132, located at Woodfield Road at the corner of the junction with Northgate Avenue (A2004). Northgate Avenue is one of the arms of the Hazelwick roundabout. The largest change in NO_2 concentrations due to the works in 2024 is predicted to be 0.1 µg/m^3 in the AQMA.

13.9.18 There are 85 receptors modelled in the Horley AQMA. The highest annual mean NO_2 concentration is predicted to be 31.3 µg/m^3 at receptor R0202. The largest change in NO_2 concentrations due to the airfield works construction phase in 2024 is predicted to be 0.5 µg/m^3 at receptors R0200 on Brighton Road (A23) and R0200 at Longbridge Road near Longbridge roundabout.

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

13.9.20 In the rest of the study area, there are seven predicted exceedances of air quality standards in annual mean NO_2 concentrations. However, the future baseline concentrations without the Project at these locations also exceed the air quality standard. The largest change (due to the Project construction works in 2024) at the receptors that exceed the air quality standard with and without the Project is 0.1 µg/m^3. The highest annual mean NO_2 concentration in 2024 is predicted to be 49.7 µg/m^3 at receptor R1042 on Thornton Road (A23).

13.9.21 The largest change in NO_2 concentrations due to the Project construction phase in 2024 is predicted to be 0.8 µg/m^3 at receptor R0605 on Green Road (the predicted concentration with the airfield construction works is predicted to be 33.4 µg/m^3). This is still below the air quality standard (40 µg/m^3).

13.9.22 Overall, three slight adverse impacts have been predicted at human receptors (R0605, R06056 and R0607) in 2024 due to the construction traffic for the airfield works for NO_2 concentrations,

with all other receptors predicted to experience negligible impacts. Therefore, no significant effects are predicted for NO_2 concentrations due to the construction of the airfield works.

13.9.23 No exceedances are predicted for annual mean PM_{10} concentrations. The highest annual mean PM_{10} concentration is predicted to be 20.9 µg/m^3 at receptor R1042 at Thornton Road (A23). The largest change in annual mean PM_{10} concentrations due to the construction of the Project in 2024 is predicted to be 0.1 µg/m^3. Overall, negligible impacts are predicted at all human receptors due to construction traffic for PM_{10} concentrations and therefore no significant effects are anticipated.

13.9.24 No exceedances are predicted for annual mean $PM_{2.5}$ concentrations. The highest annual mean $PM_{2.5}$ concentration is predicted to be 13.7 µg/m^3 at receptors R0602 (Church Road, Addlestone) and R1042 (Thornton Road – A23). The largest change in annual $PM_{2.5}$ concentrations due to the construction of the Project in 2024 is predicted to be 0.1 µg/m^3. Overall, negligible impacts are predicted at all human receptors due to the construction traffic for the airfield works for the Project for $PM_{2.5}$ concentrations and therefore no significant effects are anticipated for $PM_{2.5}$.

Ecological Receptors

13.9.25 The modelled results for ecological receptors are presented in Appendix 13.9.1.

Glover's Wood SSSI

13.9.26 The average annual mean NOx concentration predicted at Glover's Wood SSSI is 11.2 µg/m^3 with the Project in 2024. The highest predicted concentration (11.6 µg/m^3) is at the south eastern boundary of the site, located closest to Russ Hill Road to the west of the airport. The average change in annual mean NOx concentrations due to the Project in 2024 is predicted to be 0.1 µg/m^3 at the SSSI. No significant air quality effects are anticipated at this site.

Thames Basin Heaths SPA

13.9.27 The average annual mean NOx concentration predicted at Thames Basin Heaths SPA is 30.6 µg/m^3 with the Project in 2024. The highest predicted concentration (49.5 µg/m^3) is at the boundary of the site, located on the slip road at junction 10 of the M25. However, there is no change predicted at this site due to the Project in 2024 and therefore no significant air quality effects are anticipated.

Mole Gap to Reigate Escarpment SAC

13.9.28 The average annual mean NOx concentration predicted at Mole Gap to Reigate Escarpment SAC is 19.0 µg/m^3 with the Project in 2024. The highest predicted concentration (21.0 µg/m^3) is at the boundary of the site, near junction 8 of the M25. There is no change predicted at this site due to the Project in 2024 and therefore no significant air quality effects are anticipated.

Other Ecological Sites

In the first year of airfield construction works in 2024, annual mean NOx concentrations are predicted to be below the critical level/air quality standard of 30 µg/m^3 at all but nine ecological sites (Westerham Wood SSSI, Ockham and Wisley Commons SSSI, Ockham and Wisley LNR, and six ancient woodland sites). However, there is no change or reductions in NOx concentrations predicted at these sites due to the Project in 2024 and therefore no significant effects are anticipated. The only site that an increase in NOx concentrations is predicted due to

the Project is the unnamed woodland 6 (ancient woodland) site with a change of 0.1 µg/m^3. This change is unlikely to cause any significant air quality effects at this site.

Further Mitigation

13.9.29 No significant effects for air quality are anticipated for the first year of construction of airfield works (2024) as a result of the Project and therefore no further mitigation, other than that included in the Project, is proposed. As noted in Section 13.4 Assessment Methodology, the peak year of construction is closer to the end of the construction period. However, this scenario has assumed the peak construction traffic flows applied to the first year of construction (2024) as a worst case.

Future Monitoring

13.9.30 Since no significant effects have been predicted for air quality during construction, no further additional monitoring is proposed. GAL currently undertake air quality monitoring on the airport (LGW3 site) and it is anticipated the airport will continue this in the future.

Significance of Effects

13.9.31 No further mitigation or monitoring, than that included in the Project, is required and therefore the effects would remain not significant for air quality.

First Full Year of Opening: 2029

Construction Dust Assessment

13.9.32 Construction activities would continue during 2029. The assessment presented above for 2024-2029 has included all construction activities as a worst case. Therefore, effects would be no greater than those reported above.

Construction Traffic Assessment (Construction Phase for Surface Access Improvements)

Human Receptors

13.9.33 The modelled results for human receptors in 2029 are presented in Appendix 13.9.1 with all modelled human receptors shown in Appendix 13.6.2 (Figure 1.1.1 to Figure 1.1.4).

13.9.34 There are 52 receptors modelled in the Hazelwick AQMA. The highest annual mean NO_2 is predicted to be 25.7 µg/m^3 at receptor R0132, located at Woodfield Road at the corner of the junction with Northgate Avenue (A2004). The largest change in NO_2 concentrations due to the works in 2029 is predicted to be 0.4 µg/m^3 at receptors R0059 (Tinsley Close, Three Bridges) and R0147 (Crawley Avenue – A2011).

13.9.35 There are 85 receptors modelled in the Horley AQMA. The highest annual mean NO_2 concentration is predicted to be 26.6 µg/m^3 at receptor R0030. The largest change in NO_2 concentrations is predicted to be 0.4 µg/m^3 at receptor R0168. Receptor R0030 is located at The Crescent, Horley and receptor R0168 at Balcombe Road (B2036).

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

13.9.37 In the rest of the study area, there are no predicted exceedances in annual mean NO_2 concentrations. The largest change is predicted to be 1.5 µg/m^3 (from 18.9 µg/m^3 to 20.4 µg/m^3)

at a care home on Blanford Road. However, the predicted concentration is still well below the NO_2 air quality standard of 40 µg/m^3. The highest annual mean NO_2 concentration predicted in the surface access improvements phase (33.7 µg/m^3) is at the Gatwick Ambulance Station (H0329), but it is predicted that NO_2 concentrations will reduce at this receptor by 0.2 µg/m^3 during the construction phase in 2029.

13.9.38 These changes would relate to negligible impacts at all human receptors in 2029 due to the surface access improvements construction phase of the Project for NO_2 concentrations and therefore no significant effects are anticipated for NO_2.

13.9.39 No exceedances are predicted for annual mean PM_{10} concentrations. The highest annual mean PM_{10} concentration is predicted to be 20.2 µg/m^3 at receptor R0602 at Church Road, Addlestone. This is well below the air quality standard of 40 µg/m^3. The largest change in annual mean PM_{10} concentrations due to the construction of the Project in 2029 is predicted to be 0.4 µg/m^3 at Reigate Hill (A217) from 16.7 µg/m^3 to 17.1 µg/m^3. These changes would relate to negligible impacts at all human receptors due to the surface access improvements construction phase of the Project for PM_{10} concentrations and therefore no significant effects are anticipated for PM_{10}.

13.9.40 No exceedances are predicted for annual mean $PM_{2.5}$ concentrations. The highest annual mean $PM_{2.5}$ concentration is predicted to be 13.5 µg/m^3 at receptor R0602 at Church Road, Addlestone. This concentration is well below the air quality standard of 25 µg/m^3. The largest change in annual $PM_{2.5}$ concentrations due to the construction of the Project in 2029 is predicted to be 0.2 µg/m^3 at receptors CH0254 (care home on Blanford Road), R0863 (London Road – A217) and R1078 (Reigate Hill – A217). These changes would relate to negligible impacts at all human receptors due to the construction of the surface access improvements for the Project for $PM_{2.5}$ concentrations and therefore no significant effects are anticipated for $PM_{2.5}$.

Ecological Receptors

13.9.41 The modelled results for ecological receptors for the first year of surface access improvements (2029) are presented in Appendix 13.9.1.

Glover's Wood SSSI

13.9.42 The average annual mean NOx concentration predicted at Glover's Wood SSSI is 10.1 µg/m^3 with the Project in 2029. The highest predicted concentration (10.6 µg/m^3) is at the south eastern boundary of the site, located closest to Russ Hill Road to the west of the airport. The change in annual mean NOx concentrations due to the Project in 2029 is predicted to be 0.1 µg/m^3 at the SSSI. Therefore, no significant air quality effects are anticipated at this site.

Thames Basin Heaths SPA

13.9.43 The average annual mean NOx concentration predicted at Thames Basin Heaths SPA is 24.6 µg/m^3 with the Project in 2029. The highest predicted concentration (32.6 µg/m^3) is at the boundary of the site, located on the slip road at junction 10 of the M25. However, there is no change predicted at this site due to the construction for the surface access improvements in 2029 and therefore no significant air quality effects are anticipated.

Mole Gap to Reigate Escarpment SAC

13.9.44 The average annual mean NOx concentration predicted at Mole Gap to Reigate Escarpment SAC is 14.2 µg/m^3 with the Project in 2029. The highest predicted concentration (16.8 µg/m^3) is at the

boundary of the site, located near junction 8 of the M25. There is no change predicted at this site due to the Project in 2029 and therefore no significant air quality effects are anticipated.

Other Ecological Sites

13.9.45 In the first year of surface access improvements in 2029, annual mean NOx concentrations are predicted to be below the critical level/air quality standard of 30 µg/m^3 at all but two ecological sites (Huntsgreen Wood and unnamed woodland 5 ancient woodland sites). However, reductions in NOx concentrations are predicted at these sites due to the Project in 2029 and therefore no significant effects are anticipated.

Emissions Inventory

13.9.46 For the first full year of opening in 2029, the estimated annual NOx, PM_{10} and $PM_{2.5}$ emissions are presented in Table 13.9.3 broken down by each pollution source. Total emissions for this scenario have been estimated to be 2,914 t/yr for NOx, 178 t/yr for PM_{10} and 110 t/yr for $PM_{2.5}$ and 2,098 t/yr (NOx), 44 t/yr (PM_{10}) and 30 t/yr ($PM_{2.5}$) for airport-related emissions.

13.9.47 When compared to the 2029 future baseline scenario, ie without the Project (Table 13.6.3), it can be observed that the Project would result in an increase in emissions for all sources and pollutants. This is due to increases in aircraft movements and associated activities on the airport, as well as increases in road traffic. NOx emissions from aircraft are predicted to increase by 78.6 t/y for aircraft in the air and 44.9 t/y for aircraft on the ground. NOx emissions from airport-related traffic are predicted to increase by 122.7 t/y from the Project in 2029.

13.9.48 For airport-related PM_{10} and $PM_{2.5}$, the emissions are predicted to increase by 2.1 t/yr for PM_{10} and 1.4 t/yr for $PM_{2.5}$ for the first full year of opening in 2029 compared to the 2029 future baseline.

Table 13.9.3: Summary of Annual Pollutant Emissions for the First Full Year of Opening in 2029

Source	NOx (t/yr)	PM_{10} (t/yr)	$PM_{2.5}$ (t/yr)
Aircraft in the air			
Approach	254.9	1.9	1.9
Initial climb	367.2	1.0	1.0
Climb out	521.1	1.8	1.8
Aircraft on the ground			
Landing	1.1	<0.1	<0.1
Reverse thrust	16.9	0.2	0.2
Taxiing	157.5	2.3	2.3
Hold	74.1	1.1	1.1
Take-off	454.7	1.5	1.5
Brake & tyre wear	N/A	7.1	3.6
APUs	78.2	1.6	1.6
Engine testing	0.7	<0.1	<0.1

Source	NOx (t/yr)	PM_{10} (t/yr)	$PM_{2.5}$ (t/yr)
Ground equipment			
GSE	13.7	2.2	1.1
Fixed plant			
Fire training ground	0.1	<0.1	<0.1
Energy plant	18.5	0.1	0.1
Car parks			
Car parks	2.1	0.2	0.2
Roads			
Airport	136.9	22.5	13.4
Non-airport	815.9	134.1	80.1
Total (all sources)	**2,914**	**178**	**110**
Total (airport-related)	**2,098**	**44**	**30**

Modelled Concentrations

Human Receptors

13.9.49 The modelled results for human receptors for the first year of opening (2029) are presented in Appendix 13.9.1. All modelled human receptors are shown in Appendix 13.6.2 (Figure 1.1.1 to Figure 1.1.4).

13.9.50 There are 52 receptors modelled in the Hazelwick AQMA. The highest annual mean NO_2 concentration is predicted to be 25.6 µg/m^3 at receptor R0132, located at Woodfield Road at the corner of the junction with Northgate Avenue (A2004). Northgate Avenue is one of the arms of the Hazelwick roundabout. The largest change in NO_2 concentrations due to the Project in 2029 in this AQMA is predicted to be 0.1 µg/m^3.

13.9.51 There are 86 receptors modelled in the Horley AQMA. The highest annual mean NO_2 concentration is predicted to be 27.3 µg/m^3 at receptor R0030. The largest change in NO_2 concentrations due to the Project in 2029 in this AQMA is predicted to be 0.3 µg/m^3 at receptor R0039. Receptor R0030 is located at The Crescent in Horley and R0039 at Vernon Woodroyd Gardens, Horley.

13.9.52 Predicted NO_2 concentrations at all receptors in the two AQMAs would be below the air quality standard and the Project would therefore not create exceedances of the air quality standard in these areas.

13.9.53 In the rest of the study area, no exceedances are predicted in annual mean NO_2 concentrations. The highest annual mean NO_2 concentration is predicted to be 34.9 µg/m^3 at receptor H0329 (Gatwick Ambulance Station) with and without the Project in 2029. The largest change in NO_2 concentrations due to the Project in 2029 is predicted to be 0.8 µg/m^3 at receptor R0020 (Oakfields in Crawley). Predicted concentrations at this receptor with the Project are 23.9 µg/m^3. These changes would relate to negligible impacts at all human receptors in 2029 due to the Project for NO_2 concentrations and therefore no significant effects are anticipated for NO_2.

13.9.54 No exceedances are predicted for annual mean PM_{10} concentrations. The highest annual mean PM_{10} concentration is predicted to be 20.2 µg/m^3 at receptors R0571 (Ashcombe Road) and R0602 (Church Road, Addlestone). The largest change in annual mean PM_{10} concentrations due to the Project in 2029 is predicted to be 0.2 µg/m^3 at receptor R0020, Oakfields in Crawley. These changes would relate to negligible impacts at all human receptors due to the Project for PM_{10} concentrations and therefore no significant effects are anticipated for PM_{10}.

13.9.55 No exceedances are predicted for annual mean $PM_{2.5}$ concentrations. The highest annual mean $PM_{2.5}$ concentration is predicted to be 13.5 µg/m^3 at receptor R0602 at Church Road, Addlestone. The largest change in annual mean $PM_{2.5}$ concentrations due to the Project in 2029 is predicted to be 0.1 µg/m^3. These changes would relate to negligible impacts at all human receptors due to the Project for $PM_{2.5}$ concentrations and therefore no significant effects are anticipated for $PM_{2.5}$.

Ecological Receptors

13.9.56 The modelled results for ecological receptors for the first year of opening (2029) are presented in Appendix 13.9.1.

Glover's Wood SSSI

13.9.57 The average annual mean NOx concentration at Glover's Wood SSSI was predicted to be 10.1 µg/m^3 with the Project. The highest predicted concentration (10.6 µg/m^3) is at the south eastern boundary of the site, located closest to Russ Hill Road to the west of the airport. The average change in annual mean NOx concentrations due to the Project in 2029 is predicted to be 0.1 µg/m^3 at the SSSI. No significant air quality effects are anticipated at this site.

Thames Basin Heaths SPA

13.9.58 The average annual mean NOx concentration at Thames Basin Heaths SPA is predicted to be 24.4 µg/m^3 with the Project. The highest predicted concentration (32.4 µg/m^3) is at the boundary of the site, located on the slip road at junction 10 of the M25. However, there is no change predicted at this site due to the Project in 2029 and therefore no significant air quality effects are anticipated.

Mole Gap to Reigate Escarpment SAC

13.9.59 The average annual mean NOx concentration predicted at Mole Gap to Reigate Escarpment SAC is 14.9 µg/m^3 with the Project in 2029. The highest predicted concentration (16.4 µg/m^3) is at the boundary of the site, located near junction 8 of the M25. There is no change predicted at this site due to the Project in 2029 and therefore no significant air quality effects are anticipated.

Other Ecological Sites

13.9.60 In the first full year of opening in 2029, annual mean NOx concentrations are predicted to be below the critical level/air quality standard of 30 µg/m^3 at all but two ecological sites (Huntsgreen Wood and unnamed woodland 5 (ancient woodland) sites). Reductions in NOx concentrations are predicted at the unnamed woodland 5 (ancient woodland) site due to the Project in 2029 and therefore no significant air quality effects are anticipated.

13.9.61 An increase of 0.5 µg/m^3 in NOx concentrations is predicted at the Huntsgreen Wood ancient woodland site due to the project in 2029. An assessment of nitrogen (N) deposition was undertaken which predicted an increase of less than 0.1 kg N/ha/yr at the site at worst. This is

less than 1% of the site's lower critical load (10 kg N/ha/yr) and therefore no significant air quality effects are anticipated.

Further Mitigation

13.9.62 No significant effects for air quality are anticipated for the first full year of opening in 2029 as a result of the Project and therefore no further mitigation, than that included in the Project is proposed.

Future Monitoring

13.9.63 Since no significant effects have been predicted for air quality in 2029, no additional monitoring beyond that included in the Project is proposed. GAL currently undertake air quality monitoring on the airport (LGW3 site) and it is anticipated the airport will continue this in the future.

Significance of Effects

13.9.64 No further mitigation or monitoring, than the included in the Project, is required and therefore the effects would remain as not significant.

Interim Assessment Year: 2032

Construction Dust Assessment

13.9.65 Some construction activities would continue during 2032. The assessment presented for 2024-2029 has included all construction activities as a worst case. Therefore, effects would be no greater than those reported above.

Construction Traffic

13.9.66 The assessment presented for 2029 has included all construction traffic impacts that are likely to happen between 2029 and 2032 as a worse case.

Emissions Inventory

13.9.67 Table 13.9.4 presents the estimated annual emissions of NOx, PM_{10} and $PM_{2.5}$ for the interim assessment year of 2032 broken down by each pollution source. The total emissions for this scenario have been estimated to be 3,219 t/yr for NOx, 222 t/yr for PM_{10} and 136 t/yr for $PM_{2.5}$. The airport-related emissions have been estimated to be 2,293 t/yr for NOx, 48 t/yr for PM_{10} and 33 t/yr for $PM_{2.5}$.

13.9.68 When compared to the 2032 future baseline scenario, ie without the Project (Table 13.6.4), it can be observed that the Project would result in an increase in emissions for all sources and pollutants. This is due to increases in aircraft movements and associated activities on the airport, as well as increases in road traffic. NOx emissions from aircraft are predicted to increase by 217.1 t/yr for aircraft in the air and 142.8 t/yr for aircraft on the ground. NOx emissions from airport-related road traffic is expected to increase by 19.3 t/yr due to the Project in 2032.

13.9.69 For airport-related PM_{10} and $PM_{2.5}$, the emissions are predicted to increase by 6.6 t/yr for PM_{10} and 4.5 t/yr for $PM_{2.5}$ in total.

Table 13.9.4: Summary of Annual Pollutant Emissions for the Interim Assessment Year of 2032

Source	NOx (t/yr)	PM_{10} (t/yr)	$PM_{2.5}$ (t/yr)
Aircraft in the air			
Approach	281.4	1.9	1.9
Initial climb	419.8	1.0	1.0
Climb out	551.3	1.7	1.7
Aircraft on the ground			
Landing	1.1	<0.1	<0.1
Reverse thrust	18.1	0.2	0.2
Taxiing	177.6	2.2	2.2
Hold	83.4	1.1	1.1
Take-off	496.1	1.4	1.4
Brake & tyre wear	N/A	8.3	4.2
APUs	83.7	1.8	1.8
Engine testing	0.8	<0.1	<0.1
Ground equipment			
GSE	13.2	2.2	1.1
Fixed plant			
Fire training ground	0.1	<0.1	<0.1
Energy plant	18.6	0.1	0.1
Car parks			
Car parks	2.2	0.2	0.2
Roads			
Airport	145.3	26.4	15.8
Non-airport	926.1	173.8	103.0
Total (all sources)	**3,219**	**222**	**136**
Total (airport-related)	**2,293**	**48**	**33**

Modelled Concentrations

Human Receptors

13.9.70 The modelled results for human receptors for the interim assessment year (2032) are presented in Appendix 13.9.1. All modelled human receptors are shown in Appendix 13.6.2 (Figure 1.1.1 to Figure 1.1.4).

13.9.71 There are 52 receptors modelled in the Hazelwick AQMA. The highest annual mean NO_2 concentration within this AQMA is predicted to be 25.3 µg/m^3 at receptor R0132 at Woodfield Road. The largest change in NO_2 concentrations, in the AQMA, due to the Project in 2032 is predicted to be 0.1 µg/m^3.

13.9.72 There are 86 receptors modelled in the Horley AQMA. The highest annual mean NO_2 concentration within this AQMA is predicted to be 27.7 µg/m^3 at receptor R0030 (Greenings, The Crescent, Horley). The largest change in NO_2 concentrations due to the Project in 2032 is predicted to be 1.4 µg/m^3 at receptor R0082 at Riverside in Horley.

13.9.73 Predicted NO_2 concentrations at all receptors in the two AQMAs are below the air quality standard and the Project would therefore not create exceedances of the air quality standard in these areas.

13.9.74 In the rest of the study area, no exceedances are predicted in annual mean NO_2 concentrations. The highest annual mean NO_2 concentration is predicted to be 33.4 µg/m^3 at receptor H0329, located at Gatwick Ambulance Station. This is below the air quality standard of 40 µg/m^3 with an increase of 0.1 µg/m^3 predicted due to the Project. The largest change in NO_2 concentrations due to the Project in 2032 is predicted to be 1.5 µg/m^3 at receptor R0949 at A217 Brighton Road, increasing from 13.2 µg/m^3 to 14.7 µg/m^3. There are negligible impacts predicted at all human receptors. Therefore, in 2032 due to the Project there are no significant effects anticipated for NO_2 concentrations.

13.9.75 No exceedances are predicted for annual mean PM_{10} concentrations. The highest annual mean PM_{10} concentration is predicted to be 20.3 µg/m^3 at receptors R0571 (Ashcombe Road) and R0602 (Church Road, Addlestone). This is well below the air quality standard of 40 µg/m^3. The largest change in annual mean PM_{10} concentrations due to the Project is predicted to be 0.3 µg/m^3. These changes would relate to negligible impacts at all human receptors due to the Project for PM_{10} concentrations and therefore no significant effects are anticipated for PM_{10}.

13.9.76 No exceedances are predicted for annual mean $PM_{2.5}$. The highest annual mean $PM_{2.5}$ concentration due to the Project is predicted to be 13.6 µg/m^3 at receptor R0602 at Church Road, Addlestone. This is well below the air quality standard of 25 µg/m^3. The largest change in annual $PM_{2.5}$ concentrations due to the Project in 2029 is predicted to be 0.2 µg/m^3. These changes would relate to negligible impacts at all human receptors due to the Project for $PM_{2.5}$ concentrations and no significant effects are anticipated for $PM_{2.5}$.

Ecological Receptors

13.9.77 The modelled results for ecological receptors for the interim assessment year (2032) are presented in Appendix 13.9.1. Nitrogen and acid deposition assessments were undertaken for all HRA sites (Ashdown Forest SPA/SAC, Thames Basin Heaths SPA (site near the M25 junction 10), Thursley, Ash, Pirbright & Chobham SAC (site along the M3) and Mole Gap to Reigate Escarpment SAC) in 2032.

Glover's Wood SSSI

13.9.78 The average annual mean NOx concentration at Glover's Wood SSSI is predicted to be 10.1 µg/m^3 with the Project in 2032. The highest predicted concentration (10.6 µg/m^3) is at the south eastern boundary of the site, located closest to Russ Hill Road to the west of the airport. The average change in annual mean NOx concentrations due to the Project in 2032 is predicted to be 0.2 µg/m^3 at the SSSI. No significant air quality effects are anticipated at this site.

Ashdown Forest SPA/SAC

13.9.79 There are no predicted exceedances of the air quality standard of 30 µg/m^3 at the site in 2032. The largest predicted NOx concentration at Ashdown Forest SPA/SAC is 14.8 µg/m^3 along the A22, close to the edge of the road. The largest change in NOx concentrations at the SPA/SAC due to the Project is 0.1 µg/m^3 along the A22, close to the edge of the road.

13.9.80 An assessment of N deposition was undertaken for this site for inclusion in the HRA. The largest increase in N deposition due to the Project in 2032 is less than 0.1 kg N/ha/yr along the A22 close to the edge of the road. The change in N deposition is predicted to be less than 1% of the lower critical load for the site (10 kg N/ha/yr) and therefore no significant air quality effects are anticipated at this site.

13.9.81 The largest increase in acid deposition due to the Project is less than 0.1 keq/ha/yr. The change in acid deposition falls within the critical load function for this site and therefore no significant acidity effects are anticipated.

Thames Basin Heaths SPA (site near the M25 junction 10)

13.9.82 Exceedances of the air quality standard of 30 µg/m^3 are predicted at the edge of the site closest to the M25 and the A3 (up to approximately 20 metres from the A3). The largest predicted NOx concentration is 55.5 µg/m^3 approximately 1 metre from the edge of the A3 sliproad to the M25 junction 10. The largest change in NOx concentrations due to Project is 0.3 µg/m^3 at the edge of the site closest to the M25 on-slip from junction 10.

13.9.83 An assessment of N deposition was undertaken for this site for inclusion in the HRA. The largest increase in N deposition due to Project is less than 0.1 kg N/ha/yr approximately 1 metre at the edge of the site close the M25. The change in N deposition at the site is less than 1 per cent of the lower critical load for the site (10 kg N/ha/yr) and therefore no significant air quality effects are anticipated at this site.

13.9.84 The largest increase in acid deposition due to Project is less than 0.1 keq/ha/yr. The change in acid deposition falls within the critical load function for this site and therefore no significant acidity effects are anticipated.

Thursley, Ash, Pirbright & Chobham SAC

13.9.85 Exceedances of the air quality standard of 30 µg/m^3 are predicted at the edge of the site closest to the M3 (up to approximately 40 metres). The largest predicted NOx concentration is 71.6µg/m^3 approximately 1.6 metres from the edge of the M3. The largest change in NOx concentrations due to Project is 0.3 µg/m^3 at the edge of the B386 Chertsey Road within the site.

13.9.86 An assessment of N deposition was undertaken for this site for inclusion in the HRA. The largest increase in N deposition due to Project is less than 0.1 kg N/ha/yr at the edge of the site along the M3. The change in N deposition is less than 1 per cent of the lower critical load for the site (10 kg N/ha/yr) and therefore no significant air quality effects are anticipated at this site.

13.9.87 The largest increase in acid deposition due to Project is less than 0.1 keq/ha/yr. The change in acid deposition falls within the critical load function for this site and therefore no significant acidity effects are anticipated.

Mole Gap to Reigate Escarpment SAC

13.9.88 There are no exceedances of the air quality standard of 30 µg/m^3 predicted at this site in 2032. The largest predicted NOx concentration is 27.6µg/m^3 at the edge of the site closest to the M25. The largest change in NOx concentrations due to Project is 0.4 µg/m^3 at the edge of the site closest to the M25.

13.9.89 An assessment of N deposition was undertaken for this site for inclusion in the HRA. The largest increase in N deposition due to Project is less than 0.1 kg N/ha/yr at the edge of the site closest to the M25. The change in N deposition is less than 1 per cent of the lower critical load for the site (15 kg N/ha/yr) and therefore no significant air quality effects are anticipated at this site.

13.9.90 The largest increase in acid deposition due to Project is less than 0.1 keq/ha/yr. The change in acid deposition falls within the critical load function for this site and therefore no significant acidity effects are anticipated.

Other Ecological Sites

13.9.91 In the interim year of 2032, annual mean NOx concentrations are predicted to be below the critical level/air quality standard of 30 µg/m^3 at all but two ecological sites (Huntsgreen Wood and unnamed woodland 5 (ancient woodland) sites). However, only small increases in NOx concentrations are predicted at these sites due to the Project (up to 0.2µg/m^3) and therefore it is unlikely that there would be any significant air quality effects.

Further Mitigation

13.9.92 No significant effects for air quality are anticipated for the interim assessment year of 2032 as a result of the Project and therefore no further mitigation than the included in the Project is proposed.

Future Monitoring

13.9.93 Since no significant effects have been predicted for air quality in 2032, no further monitoring is proposed.

Significance of Effects

13.9.94 No further mitigation or monitoring, than the included in the Project, is required and therefore the effects would remain as not significant.

Design Year: 2038

13.9.1 As stated in paragraph 13.4.30 only aircraft emissions were calculated for this assessment scenario. By 2038 (design year of the Project) it is anticipated that there will be improvements in background air quality and vehicle emissions and therefore the 2032 assessment year represents the worst case for air quality. The 2038 design year has been assessed for the PEIR only in terms of aircraft emissions and not for road vehicle emissions. The aircraft emissions data from 2032 is included in the tables for completeness. As no road traffic emissions were calculated, there is no prediction of air quality concentrations included for this scenario. 2032 road traffic emission are included in the table for completeness.

Emissions Inventory

13.9.2 Table 13.9.5 presents the estimated annual emissions of NOx, PM_{10} and $PM_{2.5}$ for the design year of 2038 broken down by each pollution source. Total emissions for this scenario have been estimated to be 3,186 t/yr for NOx, 220 t/yr for PM_{10} and 134 t/yr for $PM_{2.5}$ with 2,260 t/yr (NOx), 46 t/yr (PM_{10}) and 31 t/yr for (PM_2) being related to the airport. The reported emissions for road vehicles (car parks and highway network) have been taken from the interim assessment year of 2032.

13.9.3 When compared to the 2038 future baseline scenario (ie without the Project) (Table 13.6.5), it can be observed that the Project would result in an increase in emissions for all sources and pollutants. This is due to increases in aircraft movements and associated activities on the airport. NOx emissions from aircraft are predicted to increase by 210.4 t/yr for aircraft in the air and 138.6t/yr for aircraft on the ground due to the Project in 2038.

13.9.4 Emissions of airport-related PM_{10} and $PM_{2.5}$ are predicted to increase by 6.0 t/yr and 4.1 t/yr respectively.

13.9.5 The design year with Project compared to the interim year with Project in 2032 (Table 13.9.4), sees decreases in the overall airport-related pollutant emissions of NOx, PM_{10} and $PM_{2.5}$. This is attributed to the improvements in technology associated with aircraft engines.

Table 13.9.5: Summary of Annual Pollutant Emissions of Aircraft Sources for the Design Year 2038

Source	NOx (t/yr)	PM_{10} (t/yr)	$PM_{2.5}$ (t/yr)
Aircraft in the air			
Approach	278.3	1.6	1.6
Initial climb	417.8	0.8	0.8
Climb out	534.0	1.3	1.3
Aircraft on the ground			
Landing	1.1	<0.1	<0.1
Reverse thrust	17.5	0.1	0.1
Taxiing	176.5	1.8	1.8
Hold	82.7	0.9	0.9
Take-off	493.4	1.1	1.1
Brake & tyre wear	N/A	8.4	4.3
APUs	83.5	1.9	1.9
Engine testing	0.8	<0.1	<0.1
Ground equipment			
GSE	9.6	1.6	0.8
Fixed plant			
Fire training ground	0.1	<0.1	<0.1
Energy plant	17.4	0.1	0.1

Source	NOx (t/yr)	PM_{10} (t/yr)	$PM_{2.5}$ (t/yr)
Car parks			
Car parks	2.2	0.2	0.2
Roads			
Airport	145.3	26.4	15.8
Non-airport	926.1	173.8	103.0
Total (all sources)	**3,186**	**220**	**134**
Total (airport-related)	**2,260**	**46**	**31**

13.10. Potential Changes to the Assessment as a Result of Climate Change

13.10.1 The potential changes to the air quality assessment as a result of climate change have been detailed in Chapter 15 and Appendix 15.9.2. The potential climate change hazards that could affect local air quality are an increase in the number of hot days and increased likelihood of extreme weather events. These could result in increased dust production during the construction phase or reduced availability of water for dust suppression measures due to extended dry periods of weather, changes in pollutant concentrations due to hot and dry weather conditions or changes in wind speed and direction, and changes in APU usage under extreme weather conditions. These changes are considered unlikely to change the significance of the predicted air quality effects.

13.11. Cumulative Effects

Zone of Influence

13.11.1 The zone of influence (ZoI) for air quality has been identified based on the spatial extent of likely effects.

Screening of Other Developments and Plans

13.11.2 The Cumulative Effects Assessment (CEA) takes into account the impact associated with the Project together with other developments and plans. The projects and plans selected as relevant to the CEA presented in this chapter are based upon the results of a screening exercise undertaken as part of the 'CEA short list' of developments (see Appendix 19.4.1). Each development on the CEA long list has been considered on a case by case basis for scoping in or out of this chapter's assessment based upon data confidence, effect-receptor pathways and the spatial/temporal scales involved.

13.11.3 In undertaking the CEA for the Project, it is important to bear in mind that the likelihood of other developments and plans being constructed varies depending on how far along the planning process they are. For example, relevant developments and plans that are already under construction are likely to contribute to a cumulative impact with the Project (providing impact or spatial pathways exist), whereas developments and plans not yet approved or not yet submitted are less certain to contribute to such an impact, as some may not achieve approval or may not ultimately be built due to other factors. For this reason, all relevant development and plans considered cumulatively alongside the Project have been allocated into 'Tiers', reflecting their

current stage within the planning and development process. Appropriate weight is therefore given to each Tier in the decision-making process when considering the potential cumulative impact associated with the Project, eg it may be considered that greater weight can be placed on the Tier 1 assessment relative to Tier 2. Further details of the screening process for the inclusion of other developments and plans in the short list and a description of the Tiers is provided in Chapter 19: Cumulative Effects and Inter-relationships.

13.11.4 The specific developments scoped into the CEA for air quality are detailed in Appendix 13.6.2 which shows the modelled receptors. Full details of each of the developments is provided in Appendix 19.4.1.

13.11.5 There are some developments within the 'CEA short list' which have not been included in the PEIR. Although this has not been considered at this stage of the assessment, there are existing human receptors which are located closer to the modelled local road network for which concentrations have been predicted, meaning that the worst case locations have been assessed.

Cumulative Effects Assessment

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

13.11.7 As described in Chapter 12: Traffic and Transport, if Heathrow R3 was to come forward, traffic levels at Gatwick would likely decline in the period immediately following the opening of R3. However, by 2047, there would be little difference between demand at Gatwick with or without Heathrow R3 and accordingly this scenario would be unchanged irrespective of developments at Heathrow. The Heathrow R3 surface access narrative is predicated on "no more traffic", which is to say that total car traffic to the Airport is to be maintained at existing levels. GAL will, however, keep this under review and as it progresses its work and prepares its final documents, including the formal Environmental Statement in support of development consent.

Construction Phases: 2024 – 2029 and 2029 – 2032

13.11.8 Traffic data used in the assessment include known future developments and the assessment therefore incorporates cumulative impacts. The inputs into the ADMS model take into account all sources of pollution either as modelled sources or in the background concentrations. The CoCP and Construction Traffic Management Plan will include measures to account for cumulative impacts where these occur. No further cumulative effects, than those included in the assessment, are likely to occur in the construction phase 2024 to 2029 or 2029 to 2032 in terms of air quality.

First Full Year of Operation: 2029

13.11.9 Traffic data used in the assessment include known future developments and the assessment therefore incorporates cumulative impacts. The ADMS model takes into account all sources of pollution either as modelled sources or in the background concentrations. No further cumulative effects, than those included in the assessment, are likely to occur in the first full year of operation 2029 in terms of air quality.

Interim Assessment Year: 2032

13.11.10 Traffic data used in the assessment include known future developments and the assessment therefore incorporates cumulative impacts. The ADMS model takes into account all sources of pollution either as modelled sources or in the background concentrations. No further cumulative

effects, than those included in the assessment, are likely to occur in the interim assessment year 2032 in terms of air quality.

Design Year: 2038

13.11.11 No detailed assessment of road traffic emissions has been undertaken for the design year 2038. It is not anticipated that there would be any significant air quality effects from road traffic emissions in this scenario and therefore, no further cumulative effects, than those included in the assessment, are likely to occur in terms of air quality.

13.12. Inter-Related Effects

13.12.1 This chapter assesses the significance of potential effects on air quality. Potential effects on ecology, traffic, climate change, socio-economics and health are assessed in Chapters 9, 12, 15, 16 and 17, respectively.

13.12.2 Further details of inter-related effects are provided in Chapter 19: Cumulative Effects and Inter-relationships.

13.13. Summary

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

Next Steps

13.13.2 For the PEIR, pollutant concentrations have only been predicted at discrete sensitive human and ecological receptors. Contour mapping of pollutant concentrations will be undertaken, and the results will be presented in the ES.

13.13.3 Any changes to traffic data for the ES will be re-assessed and the modelled study area updated accordingly.

13.13.4 Any amendments to the methodology or data inputs that occur through further engagement with stakeholders will be incorporated into the ES.

13.13.5 It is not anticipated that any odorous materials will be excavated or used during the construction phase of the Project. A more detailed assessment of odour emissions during the construction phase will be provided in the ES should this be needed based on updated reports such as the contaminated land assessment.

Table 13.13.1: Summary of Effects

Receptor	Receptor Sensitivity	Description of Impact	Short/medium/long term/permanent	Magnitude of Impact	Significance of Effect	Significant/not significant	Notes
Construction Phases 2024 – 2029 and 2029 – 2032							
Human receptors and property	High	Dust deposition and increases in suspended particulate matter	Medium-term	N/A	Not significant	Not significant	With the dust control measures proposed in the CoCP, effects would not be significant
Human receptors	High	Increase in pollutant concentrations	Medium-term	Negligible	Not significant	Not significant	
Ecological receptors	Medium	Increases in pollutant concentrations and deposition rates	Medium-term	N/A	Not significant	Not significant	
First full year of operation 2029							
Human receptors	High	Increase in pollutant concentrations	Medium-term	Negligible	Not significant	Not significant	
Ecological receptors	Medium	Increases in pollutant concentrations and deposition rates	Medium-term	N/A	Not significant	Not significant	
Interim assessment year 2032							
Human receptors	High	Increase in pollutant concentrations	Medium-term	Negligible	Not significant	Not significant	

Receptor	Receptor Sensitivity	Description of Impact	Short/medium/long term/permanent	Magnitude of Impact	Significance of Effect	Significant/not significant	Notes
Ecological receptors	Medium	Increases in pollutant concentrations and deposition rates	Medium-term	N/A	Not significant	Not significant	
Design year 2038							
Human receptors	High	Increase in pollutant concentrations	Medium-term	N/A	N/A	N/A	Not assessed in detail for the PEIR
Ecological receptors	Medium	Increases in pollutant concentrations and deposition rates	Medium-term	N/A	N/A	N/A	Not assessed in detail for the PEIR

13.14. References

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Directive 2004/107/EC of the European Parliament and of the Council of 15 December 2004 relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air.

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13.15. Glossary

Table 13.15.1: Glossary of Terms

Term	Description
µg	Microgram
ADMS	Atmospheric Dispersion Modelling System
APF	Aviation Policy Framework
APIS	Air Pollution Information System
APU	Auxiliary Power Unit
AQAL	Air Quality Assessment Level
AQMA	Air Quality Management Area
AQS	Air Quality Strategy
ARN	Affected Road Network
ATM	Air Transport Movement
CAA	Civil Aviation Authority
CEA	Cumulative Effects Assessment
CoCP	Code of Construction Practice
Defra	Department of Environment, Food and Rural Affairs
DfT	Department for Transport
DMP	Dust Management Plan
EA	Environment Agency
EFT	Emissions Factors Toolkit
EIA	Environmental Impact Assessment
EPUK	Environmental Protection UK
ES	Environmental Statement
EU	European Union
FEGP	Fixed Electrical Ground Power
GAL	Gatwick Airport Limited
GIS	Geographical Information System
GSE	Ground Support Equipment
HGV	Heavy Goods Vehicle
HRA	Habitats Regulations Assessment
IAQM	Institute of Air Quality Management
ICAO	International Civil Aviation Organization
LNRs	Local Nature Reserves
LTO	Landing and Take-off
N deposition	Nitrogen deposition
NAEI	National Atmospheric Emissions Inventory
NHS	National Health Service
NNR	National Nature Reserve
NO_2	Nitrogen dioxide
NOx	Oxides of nitrogen

Term	Description
NPPF	National Planning Policy Framework
NPPG	National Planning Practice Guidance
NPS	National Policy Statement
O_3	Ozone
OS	Ordnance Survey
PC	Process Contribution
PEC	Predicted Environmental Concentration
PEIR	Preliminary Environmental Information Report
PM_{10} and $PM_{2.5}$	Particulate matter
SACs	Special Areas of Conservation
SATURN	Simulation and Assignment of Traffic to Urban Road Networks
SO_2	Sulphur dioxide
SPAs	Special Protection Areas
SPR	Source, Pathway, Receptor
SSSI	Site of Special Scientific Interest
TRA	Traffic Reliability Area
UFP	Ultrafine Particles
UK	United Kingdom
UNECE	United Nations Economic Commission for Europe
WHO	World Health Organisation
ZoI	Zone of Influence