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London Luton Airport Expansion

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5.01 Chapter 7 Air Quality

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5.01 ENVIRONMENTAL STATEMENT CHAPTER 7: AIR QUALITY

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7 AIR QUALITY

7.1 Introduction

7.1.1 This chapter presents the assessment of likely significant effects of the Proposed Development on air quality.

7.1.2 The EIA Scoping Report, provided in **Appendices 1.1 and 1.2** to this Environmental Statement (ES) **[TR020001/APP/5.05]**, set out the proposed scope for the assessment of air quality. In summary, the following matters have been assessed and the findings reported this ES:

a. dust and particulate matter (PM_{10}, $PM_{2.5}$) emissions arising from demolition, earthworks and construction works;
b. increased emissions from vehicle journeys as a result of construction activity;
c. increased emissions as a result of staff and passenger vehicle journeys to and from the airport on the road network;
d. increased emissions from aircraft engines;
e. increased emissions from vehicles and mobile equipment operating at the airport;
f. increased emissions from energy and heating combustion plant operating at the airport;
g. miscellaneous emission from other airport activities, such as fire training and engine testing; and
h. qualitative odour assessment of operational scenarios.

7.1.3 The remainder of this chapter consists of:

a. **Section 7.2** Legislation, policy and guidance relevant to the scope and methodology of the air quality preliminary assessment;
b. **Section 7.3** Scope of the assessment;
c. **Section 7.4** Stakeholder engagement and consultation;
d. **Section 7.5** Methodology;
e. **Section 7.6** Assumptions and limitations;
f. **Section 7.7** Baseline conditions;
g. **Section 7.8** Embedded and good practice mitigation;
h. **Section 7.9** Assessment;
i. **Section 7.10** Additional mitigation;
j. **Section 7.11** Residual effects;
k. **Section 7.12** In-combination climate change;
l. **Section 7.13** Monitoring; and
m. **Section 7.14** Assessment summary.

7.2 Legislation, policy and guidance

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

7.2.2 **Table 7.1** to **Table 7.5** provides a description of the relevant legislation, policy and guidance, and where each of these have been addressed in this ES.

Legislation

Table 7.1: Air quality legislation

Legislation	How and where addressed in the ES
Air Quality (England) Regulations 2000 (Ref. 7.1) and Air Quality Standards Regulations 2010 (amended in 2016) (Ref. 7.2). Prior to UK's withdrawal from the EU, the following three EU directives were transposed into national legislation in England by the Air Quality Standards Regulations: a. Air Quality Framework Directive on ambient air quality assessment and management (96/62/EC) (Ref. 7.3) which defines the policy framework for 12 air pollutants. b. Daughter Directives, including Directive 1999/30/EC (the 1st Daughter Directive) (Ref. 7.4). c. Directive 2008/50/EC on ambient air quality and cleaner air for Europe (Ref. 7.5). The Air Quality Framework Directive set the standards for pollutants known to have harmful effects to human health and the environment and set limit values and timescales for their achievement. In particular, limit values for each specified pollutant were set through a series in the above Directives: Directive 1999/30/EC relates to nitrogen dioxide (NO_2), oxides of nitrogen (NOx) and particulate matter (amongst other pollutants), Directive 2000/69/EC relates to benzene and carbon	This legislation for England remains in force and sets the requirements that the Secretary of State (SoS) for the Environment has for air quality, which is ensuring compliance with the air quality limit values. These limit values, referred to as 'standards' hereafter, have been provided in **Table 7.2** and used in the assessment as provided in **Section 7.9.**

Legislation	How and where addressed in the ES
monoxide, Directive 2002/3/EC for ozone, Directive 2004/107/EC relates to toxic heavy metals and polycyclic aromatic hydrocarbons, and Directive 2008/50/EC relates to NO_2, NOx, particulate matter, sulphur dioxide, lead, benzene and carbon monoxide.	
Air Quality (Miscellaneous Amendment and Revocation of Retained Direct EU Legislation) (EU Exit) Regulations 2018 (Ref. 7.6) Following UK's withdrawal from the EU, EU-derived domestic legislation was retained under S.2 of the European Union (Withdrawal) Act 2018 (Ref. 7.6). Practical amendments to ensure air quality management would continue were made via this statutory instrument.	This legislation for England ensures the above EU-derived legislation remains in force. These standards have been provided in **Table 7.2** and used in the assessment as provided in **Section 7.9.**
Air Quality (Amendment of Domestic Regulations) (EU Exit) Regulations 2019 (Ref. 7.7) This regulation makes amendments to retained EU-derived domestic legislation with regard to air quality to ensure air quality management would continue via this statutory instrument.	This legislation for England ensures the above EU-derived legislation remains in force. These standards have been provided in **Table 7.2** and used in the assessment as provided in **Section 7.9.**
The Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020 (Ref. 7.8) This regulation amends the 2010 and 2018 regulations, setting a $PM_{2.5}$ air quality standard, which has since been superseded by the 2023 regulation below.	This amended $PM_{2.5}$ air quality standard has since been superseded by the 2023 regulation which sets a new target that has been provided in **Table 7.2** and used in the assessment as provided in **Section 7.9**
Environment Act 2021 (Ref. 7.9) Part IV of the Environment Act 2021 places a duty on the SoS for the Environment to develop, implement and maintain an air quality strategy with the aim of reducing atmospheric emissions and improving air quality. The Clean Air Strategy (presented in **Table 7.3**) provides this framework. This	The impact at the AQMAs is discussed in **Section 7.7** and have been assessed with the results presented in **Section 7.9**.

Legislation	How and where addressed in the ES
includes the statutory duty for local authorities to undergo a process of local air quality management and declare Air Quality Management Areas (AQMAs) where necessary.	
Environment Act 2021 (Ref. 7.10) The Environment Act 2021 requires the Secretary of State to set a long-term target (15-year minimum) for air quality, and a target (no mandate on length) for the annual amount of $PM_{2.5}$ in the air. The government published the targets on 16 December 2022 with an Environmental Improvement Plan expected in January 2023 which would set interim targets (Ref. 7.11). It also requires Local Authorities to produce an action plan to ensure standards are met for air quality management areas. The Act requires the National Air Quality Strategy to be reviewed at least every 5 years.	The impact at the AQMAs is discussed in **Section 7.7** and have been assessed with the results presented in **Section 7.9**. This assessment considers current legislated limits in the Air Quality Standard Regulations. However, the aspirations of the Act are considered in the mitigation provided in **Section 7.8**, which looks to reduce impacts, even at locations where the limits are not predicted to be exceeded.
The Environmental Targets (Fine Particulate matter) Regulations 2023 (Ref. 7.12) This regulation sets the $PM_{2.5}$ targets from the Environment Act 2021.	This statutory instrument captures the targets in the Environment Act 2021 and has been provided in **Table 7.2** and used in the assessment as provided in **Section 7.9**
National Emissions Ceilings Regulations 2018 (Ref. 7.13) In December 2016, Directive 2016/2284/EU on the reduction of national emissions of certain atmospheric pollutants came into force (the National Emissions Ceiling Directive). This Directive replaced previous versions, set emission ceilings for various pollutants and set emission reduction commitments for European member states (including for NOx and $PM_{2.5}$). The Directive has been transposed into national	The emissions of NOx and $PM_{2.5}$ related to the airport have been calculated using the methodology in **Appendix 7.1** of this ES **[TR020001/APP/5.02]**. A summary of impacts from the emissions calculated has been provided in **Section 7.9**.

Legislation	How and where addressed in the ES
legislation in England by the National Emission Ceiling Regulations 2018.	

Air Quality Standards

7.2.3 **Table 7.2** below sets out the air quality standards for the pollutants of most relevance to this assessment. Other pollutants have been screened out of this air quality assessment as they are not likely to cause exceedances of their respective standards as demonstrated by local monitoring and the work carried out by the local authority, and agreed through EIA Scoping and engagement summarised in the **Section 7.4**. Environmental Assessment Levels for volatile organic compounds, set by the Environment Agency (Ref. 7.14), are mentioned in the context of monitoring undertaken by the applicant in **Appendix 7.5** of this ES **[TR020001/APP/5.02]**. These Environmental Assessment Levels are also referred to as standards.

7.2.4 Ultrafine particles (UFP) are defined as those with one dimension less than 100 nanometres ($PM_{0.1}$). There is no established modelling methodology for UFPs and there is limited data on the health impacts due to the lack of long-term exposure studies. There is also no legislated standard for UFPs. However, $PM_{2.5}$ is considered to be a good indicator of general risk associated with exposure to particulate matter, which has been quantitatively assessed.

Table 7.2: Air quality standards from the Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020 and the Environmental Targets (Fine Particulate Matter) (England) Regulations 2023

Pollutant	Averaging period	Air quality standard
Nitrogen dioxide (NO_2)	Annual mean	40µg/m^3
	1-hour mean	200µg/m^3 not to be exceeded more than 18 times a year
Particulate matter (PM_{10})	Annual mean	40µg/m^3
	24-hour mean	50µg/m^3 not to be exceeded more than 35 times a year
Fine particulate matter ($PM_{2.5}$)	Annual mean	10µg/m^3 to be achieved by 2040
Ammonia (NH_3)*	Annual mean	3 µg/m^3 (1 µg/m^3 where lichens or bryophytes are present)
Oxide of nitrogen (NOx)*	Annual mean	30µg/m^3
Notes: *For protection of vegetation and ecosystems rather than human health.		

Policy

Table 7.3: Air quality policy

Policy	How and where addressed in the ES
National Planning Policy Framework (NPPF) (2021) (Ref. 7.15) The NPPF refers to how the planning system should contribute to and enhance the natural and local environment and prevent new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of air pollution (Paragraph 174); how planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national standards for pollutants (Paragraph 186); and how sustainable transport should be focused on to help reduce congestion and emissions and improve air quality (Paragraph 105).	**Section 7.8** provides the mitigation that looks to reduce the impacts to the natural and local environment. The standards have been used in the assessment as provided in **Section 7.9**, which include values relevant to the natural environment. The **Travel Plan** submitted as part of the application for development consent **[TR020001/APP/7.13]** describes the sustainable transport options that form part of the Proposed Development.
National Policy Statement for National Networks (NPSNN) (2014) (Ref. 7.16) The NPSNN sets out the need for, and Government's policies to deliver, development of nationally significant infrastructure projects on the national road and rail networks in England. It provides planning guidance for promoters of nationally significant infrastructure projects (NSIP) on the road and rail networks. The provisions of the NPSNN relevant to environmental assessment broadly mirror those as outlined in the ANPS.	There are no elements of the Proposed Development on the national road or rail network that would be classified as a NSIP in their own right. However, the NPSNN remains an important and relevant consideration, particularly as works are proposed on the Strategic Road Network (SRN) at Junction 10 of the M1 as part of the Proposed Development. The relevant polices of the NPSNN are consistent with the relevant policies of the ANPS and have not, therefore, been repeated here and accordingly the ANPS compliance table (**Table 7.4**) provides the necessary policy response.
The Clean Air Strategy 2019 (Ref. 7.17) This provides the framework for ensuring compliance with air quality standards based on a combination of international, national and local measures to reduce emissions and improve air quality.	The standards have been used in the assessment as provided in **Section 7.9**.

Policy	How and where addressed in the ES
Aviation Policy Framework (Ref. 7.18) The aviation policy framework sets out the government's policy to allow the aviation sector to continue to make a significant contribution to economic growth across the country. It provides the baseline for the Airports Commission to take into account environmental impacts. It sets out government's objectives on the issues which will challenge and support the development of aviation across the UK. The policy on air quality is to seek improved international standards to reduce emissions from aircraft and vehicles and to work with airports and local authorities as appropriate to improve air quality, including encouraging HGV, bus and taxi operators to replace or retrofit with pollution-reducing technology older, more polluting vehicles. The policy states that around airports, sources of air pollution include aircraft engines, airport related traffic on local roads and surface vehicles at the airport. The most important pollutants are NOx and particulate matter (PM_{10} and $PM_{2.5}$). Air quality in local air quality management areas or where limit values are exceeded are particularly sensitive to new developments or transport pressures, and cumulative impacts from different individual sites can exacerbate this. Airports are large generators of surface transport journeys and as such share a responsibility to minimise the air quality impact of these operations.	An assessment of potential air quality impacts from the construction and operational phase has been undertaken as provided in the methodology in **Section 7.5**, including emissions of NOx, PM_{10} and $PM_{2.5}$ from the airport and airport related traffic. The air quality impacts at receptors including those within AQMAs are presented in **Section 7.9**. **Section 7.8** provides the measures to mitigate air quality impacts.
Aviation strategy: making best use of existing runways (Ref. 7.19) As a result of the Aviation strategy call for evidence and further analysis, government has set out its support of airports beyond Heathrow making best use of their existing runways, subject to related economic and environmental considerations being considered.	Air quality impacts assessed are provided in **Section 7.9**. **Section 7.8** provides the mitigation that looks to reduce the impacts to the natural and local environment.

Policy	How and where addressed in the ES
This document forms part of the government's wider Aviation strategy and sets out the detail of the 'making best use' policy. The main issues raised included the need for environmental issues such as noise, air quality, and carbon to be fully addressed as part of any airport proposal. Most of the concerns raised can be addressed through the existing policies as set out in the 2013 Aviation Policy Framework (Ref. 7.18), or through more recent policy updates such as the new UK Airspace Policy or National Air Quality Plan. For the majority of environmental concerns, the government expects these to be taken into account as part of existing local planning application processes. The government recognises the impact on communities living near airports and understands their concerns over local environmental issues, particularly noise, air quality and surface access. As airports look to make the best use of their existing runways, it is important that adverse impacts are mitigated where possible.	
Aviation Strategy (consultation finished) (Ref. 7.20) The Government has prepared a draft of the Aviation Strategy which will replace the Aviation Policy Framework when finalised. As part of the emerging Aviation Strategy, the Government published a policy paper entitled 'Aviation 2050: The future of UK aviation'. The government aims to "*achieve a safe, secure and sustainable aviation sector…provided that growth takes place in a sustainable way, with actions to mitigate the environmental impacts*". It will investigate whether the regulations, controls and incentives in place will tackle air quality concerns and ensure that there	Air quality impacts assessed are provided in **Section 7.9**. **Section 7.8** provides the measures to mitigate air quality impacts.

Policy	How and where addressed in the ES
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*".	
Flightpath to the future (Ref. 7.21) The Department for Transport set out the 10-year aviation policy framework in May 2022. Section 4 includes reference to the Jet Zero Strategy which includes aims for reducing the aviation industry impacts on local air quality.	Air quality impacts assessed are provided in **Section 7.9**. **Section 7.8** provides the measures to mitigate air quality impacts.
Jet Zero Strategy (Ref. 7.22) The focus of this strategy, is reducing CO_2 emissions; however delivery on this can provide other environmental benefits, such as improving air quality.	The strategy sets out the proposed approach and principles to deliver the ambition of decarbonising aviation. The proposals have been considered in the Operational Air Quality Plan in **Appendix 7.5** of this ES **[TR020001/APP/5.02]**.
Decarbonising Transport (Ref. 7.23) This plan sets out the government's commitments and the actions needed to decarbonise the entire transport system in the UK. It includes the pathway to net zero transport in the UK; the wider benefits net zero transport can deliver (including air quality benefits); and the principles that underpin the approach to delivering net zero transport including commitments to end the sale of new petrol and diesel cars and vans by 2030, from 2035 all new cars and vans must be zero emission at the tailpipe.	The vehicle fleet emissions used in this assessment are provided in the methodology in **Section 7.5** and **Appendix 7.1** of this ES **[TR020001/APP/5.02]**.
The Luton Local Plan 2011-2031 (Ref. 7.24) Policy LLP6 relates to London Luton Airport. Regarding proposals for airport expansion, the policy states the following: "*Proposals for development will only be supported where the following criteria are met, where applicable/appropriate having regard to the nature and scale of such proposals:-*	The increase in aircraft movements have been assessed as discussed in **Section 7.5** and **Section 7.8** provides the measures to mitigate air quality impacts. Cumulative impacts have been assessed and discussed in **Chapter 21** of this ES **[TR020001/APP/5.01]**, and **Section 7.8** provides the measures to mitigate air quality, odour and dust impacts.

Policy	How and where addressed in the ES
[…] *iv. they fully assess the impacts of any increase in Air Transport Movements on surrounding occupiers and/or local environment (in terms of noise, disturbance, air quality and climate change impacts), and identify appropriate forms of mitigation in the event significant adverse effects are identified;*" Policy LLP38 regarding pollution and contamination. The policy states: "*Evidence on the impacts of development will need to demonstrate whether the scheme (individually or cumulatively with other proposals) will result in any significantly adverse effects with regard to air, land or water on neighbouring development, adjoining land or the wider environment. Where adverse impacts are identified, appropriate mitigation will be required. This policy covers chemical, biological and radiological contamination and the effects of noise, vibration, light, heat, fluid leakage, dust, fumes, smoke, gaseous emissions, odour, explosion, litter and pests*."	
Central Bedfordshire Council (CBC) Local Plan 2015-2035 (Ref. 7.25) The CBC Local Plan 2015-2035 Strategic Objective SO13 states: "*Support the necessary changes to adapt to climate change by minimising emissions of carbon and local air quality pollutants*" Policy HQ1 states: "*The Council will ensure that all developments are of the highest possible quality and respond positively to their context. All development proposals, including extensions and change of use, must ensure that:* *[…] There is not an unacceptable adverse impact upon nearby existing or permitted*	The air quality impacts within the CBC South Bedfordshire AQMA and the results are presented in **Section 7.9**. **Section 7.8** provides the measures to mitigate air quality impacts.

Policy	How and where addressed in the ES
uses, including impacts on amenity, privacy, noise or air quality." Policy CC8 also refers to airborne pollution and states: "*Development proposals which are likely to cause pollution or land instability, or are likely to be exposed to potential unacceptable levels of pollution or land instability will only be permitted where it can be demonstrated that:* *1. In or near an AQMA, development would not have a negative impact on the local air quality and that;* *2. Measures can be implemented to minimise the impacts of pollution and land instability to an acceptable level without compromising the quality of life for users and occupiers, which protects health, natural and historic environment, water quality, property, infrastructure and amenity; and* *3. The conditions of the site can be suitably mitigated or land can be remediated for the proposed end use and cause no adverse effects.*"	
North Hertfordshire District Council (NHDC) Local Plan No. 2 with Alterations (April 1996) (Ref. 7.26) There are no specific air quality policies in the current Local Plan. However, NHDC have produced a Proposed Submission Draft Local Plan which includes policy addressing air quality. This is provided below.	No air quality related policy to address.
North Hertfordshire District Council Draft Local Plan for 2011-2031 (Ref. 7.27) NHDC produced a Proposed Submission Draft Local Plan for 2011-2031 in 2016. Policy D4 addresses air quality and states: "*Planning permission will be granted where development proposals:*	An assessment of potential air quality impacts from the construction phase and operational has been undertaken as provided in the methodology in **Section 7.5**. **Section 7.8** provides the measures to mitigate air quality impacts.

Policy	How and where addressed in the ES
a. Give consideration to the potential or actual impact on local air quality, both during the demolition/ construction phase and as a result of its final occupation and use; *b. Propose appropriate levels of mitigation to minimise emissions to the atmosphere and their potential effects upon health and the local environment; and* *c. Carry out air pollution impact assessments, where required, to determine the impact on local air quality of the development, otherwise the development may be refused.* *Where air pollution impact assessments are not required there will still be a requirement on developers to provide appropriate levels of mitigation to address emissions of pollutants to the atmosphere.*"	NHDC has also produced an Air Quality Planning Guidance Document in support of their Local Plan. The document provides guidance for impact assessment and mitigation. This guidance has been considered in the methodology provided **Section 7.5**.
Dacorum Borough Council Core Strategy (2006-2031) (Ref. 7.28) Air quality is mentioned in Policy CS7 (Rural Area) and Policy CS8 (Sustainable Transport) in related to emissions from cars. Air quality is also included in Policy CS30 (Sustainable Offsetting): "*Action plans will highlight mitigation measures for each AQMA. The planning system will be used to support these action plans. It does not necessarily follow that development would be harmful in an area of poor air quality or that it should be banned in an AQMA. Here, the type, scale and location of development and its traffic generation will be managed sensitively. Greater weight will be given to the consideration and removal of air pollutants.*" However, air quality is specifically addressed in Policy CS32 (Air, Soil and Water Quality): "*Development will be required to help:* *(a) support improvements in identified Air Quality Management Areas and*	An assessment of potential air quality impacts from the construction phase and operational has been undertaken as provided in the methodology in **Section 7.5**. **Section 7.8** provides the measures to mitigate air quality impacts.

Policy	How and where addressed in the ES
maintain air quality standards throughout the area; […] *Any development proposals which would cause harm from a significant increase in pollution (into the air, soil or any water body) by virtue of the emissions of fumes, particles, effluent, radiation, smell, heat, light, noise or noxious substances, will not be permitted.*"	

7.2.5 The Airports National Policy Statement (ANPS) (Ref. 7.29) does not have effect in relation to an application for development consent for an airport development not comprised of an application relating to the Heathrow Northwest Runway. Nevertheless, as set out within paragraph 1.41 of the ANPS, the Secretary of State considers that the contents of the ANPS will be both important and relevant considerations in the determination of such an application, particularly where it relates to London or the south east of England. In particular, the ANPS makes clear that, alongside the provision of a new Northwest Runway at Heathrow, the government supports other airports making best use of their existing runways as set out in Beyond the Horizon: Making best use of existing runways (MBU) (Ref. 7.30), which is the specific policy context for this application.

7.2.6 In addition, whilst the ANPS does not have effect in relation to the Proposed Development, it sets out a number of principles for environmental impact assessment and compliance and these will be an important and relevant consideration in the determination of the application for development consent. A summary of the relevant provisions for the air quality assessment and how and where these have been addressed in this ES is provided within **Table 7.4**.

Table 7.4: How relevant air quality requirements of ANPS are addressed in this ES

ANPS Section	How and where addressed in the ES
Paragraph 5.5 "*The Government's objective for surface access is to ensure that access to the airport by road, rail and public transport is high quality, efficient and reliable for passengers, freight operators and airport workers who use transport on a daily basis. The Government also wishes to see the number of journeys made to airports by sustainable modes of transport maximised as much as possible. This should be delivered in a way that minimises congestion and environmental impacts, for example on air quality.*"	**Chapter 18** of this ES **[TR020001/APP/5.01]** considers surface access to the airport. The air quality impacts from road traffic have been assessed and the results are presented in **Section 7.9.**

ANPS Section	How and where addressed in the ES
Paragraph 5.33 "*The environmental statement should assess:* • *Existing air quality levels for all relevant pollutants referred to in the Air Quality Standards Regulations 2010 and the National Emission Ceilings Regulations 2002 (as amended) or referred to in any successor regulations;* • *Forecasts of levels for all relevant air quality pollutants at the time of opening, (a) assuming that the scheme is not built (the 'future baseline'), and (b) taking account of the impact of the scheme, including when at full capacity; and* • *Any likely significant air quality effects of the scheme, their mitigation and any residual likely significant effects, distinguishing between those applicable to the construction and operation of the scheme including any interaction between construction and operational changes and taking account of the impact that the scheme is likely to cause on air quality arising from road and other surface access traffic.*"	This ES includes an assessment of existing air quality levels for all pollutants at risk of exceeding the air quality limit values in the study area. For detail of the air quality baseline, please see baseline information provided in **Section 7.7**. The assessment forecasts levels for all relevant air quality pollutants at the time of opening, with and without the Proposed Development in operation. See **Section 7.7**. A summary of impacts has been provided in **Section 7.9**. The assessment determines the significance of effects from all Proposed Development related activities (both construction and operation). See **Appendix 7.1** of this ES **[TR020001/APP/5.02]** for the methodology. A summary of impacts has been provided in **Section 7.9**.
Paragraph 5.42 and 5.43 set out the considerations for decision-making with regard to air quality. "*5.42 The Secretary of State will consider air quality impacts over the wider area likely to be affected, as well as in the vicinity of the scheme. In order to grant development consent, the Secretary of State will need to be satisfied that, with mitigation, the scheme would be compliant with legal obligations that provide for the protection of human health and the environment.* *5.43 Air quality considerations are likely to be particularly relevant where the proposed scheme:* • *is within or adjacent to Air Quality Management Areas, roads identified as being above limit values, or nature conservation sites (including Natura 2000*	The assessment includes consideration of all areas which are likely to be particularly relevant to the decision-making by the Secretary of State. A summary of impacts has been provided in **Section 7.9**.

ANPS Section	How and where addressed in the ES
sites and Sites of Special Scientific Interest); *• would have effects sufficient to bring about the need for new Air Quality Management Areas or change the size of an existing Air Quality Management Area, or bring about changes to exceedances of the limit values, or have the potential to have an impact on nature conservation sites; and* *• after taking into account mitigation, would lead to a significant air quality impact in relation to Environmental Impact Assessment and / or to a deterioration in air quality in a zone or agglomeration.*"	

Guidance

Table 7.5: Air quality guidance

Guidance	How and where addressed in the ES
Local Air Quality Management Technical Guidance (Ref. 7.31) The Local Air Quality Management (LAQM) Technical Guidance (TG22) is designed to support local authorities in carrying out their duties to review and assess air quality in their area. It provides the technical guidance for carrying out air quality assessments using existing air quality tools.	Where relevant, this guidance has been taken into account in the assessment methodology in **Section 7.5**.
Institute of Air Quality Management Dust Guidance (Ref. 7.32) The Institute of Air Quality Management (IAQM) dust guidance provides a methodology for development consultants and environmental health officers on how to assess air quality impacts from demolition and construction.	

Guidance	How and where addressed in the ES
EPUK/IAQM Land Use Planning and Development Control (Ref. 7.33) The Land-Use Planning and Development Control guidance document produced by Environmental Protection UK (EPUK) and the IAQM provides a framework for professionals operating in the planning system to provide a means of reaching sound decisions, having regard to the air quality implications of development proposals. The document provides guidance on when air quality assessments are required by providing screening criteria regarding the size of a development, changes to traffic flows/composition energy facilities or combustion processes associated with the development.	
IAQM guide to the assessment of air quality impacts on designated nature conservation sites (Ref. 7.34) The IAQM published guidance for assisting in the assessment of the air quality impacts of development on designated nature conservation sites.	
Natural England's approach to advising competent authorities on the assessment of road traffic emissions under the Habitats Regulations (Ref. 7.35) This guidance is designed to assist in giving practical and proportionate advice on the assessment of the potential impacts from road traffic emissions on the qualifying features of European Sites.	

Guidance	How and where addressed in the ES
IAQM Monitoring in the Vicinity of Demolition and Construction (Ref. 7.36) The IAQM has published guidance on air quality monitoring in the vicinity of demolition and construction sites, providing an update to the 2012 IAQM publication, and takes into account new research, feedback from users of the 2012 Guidance, and advances in monitoring technology.	
IAQM Odour and Planning Guidance (Ref. 7.37) The IAQM has published guidance for assessing odour impacts (on amenity) for planning purposes. This includes information on various assessment methods to be used to undertaken odour assessments for planning.	
International Civil Aviation Organization (ICAO) Airport Air Quality Manual (Ref. 7.38) The ICAO has published a manual for assessing air quality at airports. This document describes the methods for calculating emissions during different operating modes of the aircraft, as well as different sources of air pollution found at airports.	

Guidance	How and where addressed in the ES
Air Navigation Guidance 2017 (Ref. 7.39) In January 2002, the then Department for Transport, Local Government and the Regions issued guidance to the Civil Aviation Authority (CAA) which has subsequently formed the basis of how the CAA interprets its environmental duties in respect of carrying out its air navigation functions including approving changes to the UK's airspace design. With regards to air quality, the guidance states: "*Studies have shown that NOx emissions from aviation related operations reduce rapidly beyond the immediate area around the runway. Due to the effects of mixing and dispersion, emissions from aircraft above 1,000 feet are unlikely to have a significant impact on local air quality. Therefore the impact of airspace design on local air quality is generally negligible compared to changes in the volume of air traffic and that of the local transport infrastructures feeding the airport."*	
World Health Organization (WHO) global air quality guidelines (Ref. 7.40) The 2021 guidelines update the previous 2006 edition with generally more stringent guidelines for pollutants. These guidelines take into account the latest body of evidence on the health impacts of different air pollutants. The overall objective of the updated global guidelines is to offer quantitative health-based recommendations for air quality management, expressed as long- or short-term concentrations. These guidelines are not legally binding standards.	The World Health Organisation (WHO) global air quality guidelines are not currently part of UK legislation or policy, so the thresholds used to assess schemes remain those identified above. Until such thresholds are changed, which may or may not reflect the WHO Guidelines, then assessment is undertaken in accordance with current legislation which is consistent with policy standards. To determine the significance of air quality impacts the methodology detailed in **Appendix 7.5 [TR020001/APP/5.02]** has been used. However, the measures provided in **Section 7.8**, will reduce impacts, even at locations where the current legislated standards are not predicted to be exceeded. The **Green Controlled Growth** proposals **[TR020001/APP/7.08]** also provides an enforceable and ambitious mechanism for

Guidance	How and where addressed in the ES
	controlling air quality impacts as a result of the Proposed Development.

7.3 Scope of the assessment

7.3.1 This section describes the scope of the air quality assessment, including how the assessment has responded to the Scoping Opinion. The temporal and spatial scope, the relevant receptors, and matters scoped in and out are identified. A description of engagement undertaken with relevant technical stakeholders to develop and agree this scope is provided in **Section 7.4**.

Scoping Opinion

7.3.2 The EIA Scoping Report set out the proposed scope and assessment methodologies to be employed in the EIA and is provided in **Appendices 1.1 and 1.2** of this ES **[TR020001/APP/5.05]**.

7.3.3 In response to that Scoping Report, a Scoping Opinion was received from the Planning Inspectorate on 9 May 2019 and is provided in **Appendix 1.3** of this ES **[TR020001/APP/5.05]**.

7.3.4 **Table 7.6** describes the main matters highlighted by the Planning Inspectorate in the Scoping Opinion and how these have been addressed in this ES. Responses to all comments received during scoping are presented in **Appendix 1.4** of this ES **[TR020001/APP/5.02].**

Table 7.6: Air quality Scoping Opinion comments

Scoping Opinion ID	Scoping Opinion comment	How this is addressed
4.1.1	The Inspectorate considers that significant effects from increased flight movements are not anticipated in relation to this matter [I.e., jettisoning of fuel from aircraft] and that it may be scoped out from further assessment. This is on the basis that jettisoning of fuel is an infrequent event that will occur over water and at high altitude in order to vaporise the fuel and facilitate dispersion.	Scoped out. No action required.
4.1.2	The Scoping Report sets out the approach to the air quality assessment, and details throughout the aspect chapter the main issues and impacts likely to occur. However, these issues/impacts are not described consistently within the chapter. The ES should clearly assess any air quality impacts where significant effects are likely to arise during both construction	This ES clearly identifies and assesses any air quality impacts where significant effects are likely to arise during both construction and operation of the Proposed Development as reported in **Section 7.9**.

Scoping Opinion ID	Scoping Opinion comment	How this is addressed
	and operation of the Proposed Development.	
4.1.3	The Scoping Report states that consultation with the relevant local authorities will continue throughout the pre-application stages of the Proposed Development. Any agreements reached with the consultation bodies on the Applicant's methodological approach should be documented in the ES, where possible.	**Section 7.4** and **Table 7.7** describe details of consultation and agreements with consultation bodies undertaken during the pre-application stages relevant to preparing this ES.
4.1.4	The Applicant proposes a study area of 15km by 15km centred on the main site of the Proposed Development, and any additional roads outside of this area. The Inspectorate considers that the model extent should not be arbitrarily defined but instead should relate to the area over which significant air quality effects arising from the Proposed Development may occur, including a consideration of any Off-site Highways Interventions. This should be clearly defined within the ES. The Applicant should make effort to agree the study area with relevant consultation bodies. The assessment in 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 study area has been clearly defined and justified in this ES to account for airport emission sources, aircraft emissions during arrival and departure up to an altitude of 457m, and the affected road network (ARN) as detailed in **Section 7.3**. The modelling scenarios are also provided. The study area has been discussed and developed with stakeholders in the air quality working group from 2018 to 2022 as detailed in **Section 7.4**.
4.1.5	The Scoping Report refers to local nature sites that lie within 2km of the site of the Proposed Development and refers to the biodiversity aspect chapter as providing further detail on these. The ES should provide a full assessment of the air quality impacts on these sites where significant effects are likely. Where information to support the assessment is to be presented in the biodiversity aspect chapter of the ES, clear cross referencing to the relevant sections of other chapters should be included and, where relevant,	Assessment of impacts at ecological sites has been carried out in this ES, **Section 7.9** and **Chapter 8** Biodiversity **[TR020001/APP/5.01]** and clearly cross referenced in this chapter, where required.

Scoping Opinion ID	Scoping Opinion comment	How this is addressed
	supporting plans provided in order to assist the reader.	
4.1.6	The Scoping Report states that baseline data collection is ongoing, with both desk studies and field surveys undertaken to date. The ES should clearly set out all studies and surveys undertaken to inform the final baseline information, including the timing of any site visit and how/if professional judgement has been applied. The Applicant should make effort to agree its approach with the relevant consultation bodies.	The location and data collection for all surveys has been discussed and agreed with the relevant local authorities. Details of baseline information collected are included in **Section 7.7**.
4.1.7	The Scoping Report states that the future assessment years are based on current forecast passenger demands and proposed capacity phasing. The Inspectorate understands that these demands could change, and that this would also have a bearing on the assessment scenarios to be used in the Traffic and Transport aspect chapter. The ES should also assess effects occurring during key phases of the construction and operation of the Proposed Development, outlined at Paragraph 3.6.2 of the Scoping Report as 2027 and 2036. The ES should clearly set out the years on which the assessments have been undertaken, providing a full justification for the years chosen.	This ES has assessed future assessment years of 2027 (21.5 mppa), 2039 (27 mppa) and 2043 (32 mppa) using current demand forecasts. These are clearly reported in **Section 7.9**. The reasons for these years being selected are descried in **Chapter 5** of this ES **[TR020001/APP/5.01]**. A sensitivity analysis of a Faster Growth and Slower Growth scenario has been undertaken as detailed in **Section 7.9** and the results are provided in **Appendix 7.4** of this ES **[TR020001/APP/5.02].**
4.1.8	The Scoping Report states that the potential odours from construction will be considered as part of the soils and geology assessment rather than within the air quality aspect chapter. The ES should contain adequate cross referencing to direct the reader to the relevant sections of the ES to ensure that a robust assessment of air quality impacts has been undertaken.	The potential for odour from construction activity has been considered in the methodology provided in **Appendix 7.1** of this ES **[TR020001/APP/5.02]**. The results of the odour assessment are provided in **Section 7.9**.

Scoping Opinion ID	Scoping Opinion comment	How this is addressed
4.1.9	The Scoping Report states that 'the air quality assessment will determine the population affected by significant concentrations' and that this will then be considered in the health and community aspect chapter. The ES should contain adequate cross referencing to direct the reader to the relevant sections of the ES to ensure that a robust assessment of air quality impacts to the health of receptors has been undertaken.	This assessment reports results of significance at human receptors which are provided in **Section 7.9,** and the population air quality impacts are reported in **Chapter 13** Health and Community of this ES **[TR020001/APP/5.01]**.
4.1.10	The Applicant should also give consideration to operational mitigation measures such as single engine taxi, measures to incentivise reductions in use of aircraft auxiliary power units whilst on stand (using fixed electrical ground power and preconditioned air) in its assessment.	Operational mitigation measures have been embedded in the design and an Outline Operational Air Quality Plan (**Appendix 7.5** of this ES **[TR020001/APP/5.02]**) has been included detailing all proposed mitigation measures.
4.1.11	The ES should include an assessment of the impacts associated with activities involving combustion, where they are likely to give rise to significant effects.	This ES includes assessment of on-site combustion activities where they are likely to give rise to significant effects. See **Section 7.5**.
4.1.12	The Inspectorate considers that the potential for air quality effects on rivers and flood storage areas due to deposition of pollutants should be taken into account within the assessment, particularly where the Proposed Development has potential to give rise to stagnant or low flow conditions, where likely significant effects could occur.	With regards to nitrogen deposition as a result of NOx emissions, an assessment of impacts at relevant ecological sites has been carried out in this ES, **Section 7.9**. The Proposed Development does not give rise to any stagnant or low flow conditions in any water body. No surface water flood storage areas are proposed, and those existing are for attenuation not permanent storage. The Proposed Development does not increase flood risk. Therefore, no significant effects are likely and these receptors are not considered further in this assessment.

Spatial scope

Study area

7.3.5 The criteria from the IAQM dust guidance (Ref. 7.32) has been used to determine the study area for the assessment of construction dust, which states the following:

a. 350m from the boundary of dust generating activity (50m for ecological effects); and

b. 50m from the routes used by construction vehicles, up to 500m from the construction site entrance.

7.3.6 For the assessment of operational and construction phase emissions, the criteria from the IAQM/EPUK guidance (Ref. 7.33) has been used to determine the affected road network (ARN). The ARN includes all roads in the traffic model which are predicted to experience, due to the Proposed Development:

a. a change of Light Duty Vehicle (LDV) flows of more than 100 Annual Average Daily Traffic (AADT) movements within or adjacent to an AQMA, or more than 500 AADT elsewhere;

b. a change of Heavy-Duty Vehicle (HDV) flows of more than 25 AADT movements within or adjacent to an AQMA, or more than 100 AADT elsewhere;

c. a change of 5m or more in the realignment of a road and the road is within an AQMA; or

d. The introduction or removal of a junction near relevant receptors which cause traffic to significantly change vehicle accelerate/decelerate, e.g. traffic lights, or roundabouts.

7.3.7 A 15km by 15km grid area around the centre of the Main Application Site (as defined in **Chapter 2** of this ES **[TR020001/APP/5.01]**) of the Proposed Development is selected to account for possible significant effects to air quality as a result of airport emission sources and was selected to cover the immediate vicinity of the airport, Luton and the AQMAs in Hitchin. It was also selected to account for aircraft emissions during arrival and departure up to an altitude of 457m, further details are provided in **Appendix 7.1** of this ES **[TR020001/APP/5.02]**. Previous modelling assessments at other major UK airports have shown that air quality impacts from aircraft and on-airport sources are captured by a study area of this scale. In addition, two Preliminary Environmental Information Reports (PEIRs) (2019 PEIR and 2022 PEIR) with a full air quality modelling study were prepared for the Proposed Development which have been through statutory consultation (2019 and 2022) and technical consultation with stakeholders which both demonstrated the area being assessed was more than adequate in terms of identifying any potential significant effects. The study area includes areas within 200m of the ARN and therefore, is not limited to the 15km by 15km area.

7.3.8 Not all roads included in the traffic model in the 15km by 15km study area are expected to experience changes of the magnitude detailed above. However, for

the modelling to be more complete, some roads within the 15km by 15km study area that do not satisfy the IAQM/EPUK criteria have been included, using professional judgement and to include road emission within 200m of receptors in proximity to the ARN. For example, roads located in the key AQMAs being considered have been assessed regardless of the predicted changes.

7.3.9 The study area is shown in **Figure 7.1** of this ES **[TR020001/APP/5.03]**.

Zone of influence

7.3.10 The zone of influence (ZOI) for air quality in the cumulative effects assessment is the 15km by 15km study area around the Proposed Development, as well as within 200m of the defined ARN. The full cumulative effects assessment is provided in **Chapter 21** of this ES **[TR020001/APP/5.01]**.

Temporal Scope

7.3.11 The Proposed Development has been assessed over three assessment phases, during which construction and operation may take place simultaneously. The years and airport capacity for each assessment phase are described in **Chapter 5** of this ES **[TR020001/APP/5.01]**.

7.3.12 The air quality assessment considers the following scenarios:

a. Baseline (2019);
b. 2027 with and without the Proposed Development;
c. 2039 with and without the Proposed Development; and
d. 2043 with and without the Proposed Development.

7.3.13 The scenarios capture the assessment phases (Phase 1, Phase 2a and Phase 2b) described in **Table 5.3** and assess the combination of the operational and construction impacts occurring in the same phase. Sensitivity test scenarios (as described in **Chapter 5** of this ES **[TR020001/APP/5.01]**) have also been assessed, the details of which are provided in **Section 7.9** and **Appendix 7.1** of this ES **[TR020001/APP/5.02]**.

Receptors

7.3.14 For the assessment of construction dust, the identification of receptors and their sensitivity to dust effects follows IAQM guidance (Ref. 7.32).

7.3.15 For the assessment of all other impacts, all sensitive receptors are considered to be equally sensitive. Sensitive human receptors are defined as residential properties, schools, hospitals and care homes which are located in areas which may experience a change in pollutant concentrations. The receptor IDs used (detailed in **Appendix 7.1** of this ES **[TR020001/APP/5.02]**) are preceded with letters which correspond to their type:

a. H = Residential property (homes)
b. C = Cultural heritage (Luton Hoo and Someries Castle)
c. CH = Care Home

d. HC = Healthcare and hospital
e. N = Nursery
f. S = School

7.3.16 Sensitive ecological receptors assessed include statutory designated sites including the following:

a. Special Areas of Conservation (SAC);
b. Special Protection Areas (SPA);
c. Site of Special Scientific Interest (SSSI); and
d. National Nature Reserves (NNRs).

7.3.17 Non-statutory designated ecological sites have also been assessed, which include the following:

a. Local Nature Reserves (LNRs);
b. Local Wildlife Sites (LWS), including District Wildlife Sites (DWS) and County Wildlife Sites (CWS);
c. Ancient Woodland (AW); and
d. Ancient and Veteran Trees.

7.3.18 Cultural heritage receptors have been added following consultation to assess sensitive locations which could be affected by acid erosion from air pollutants.

7.3.19 Details of the receptors are provided in **Appendix 7.1** of this ES **[TR020001/APP/5.02]**.

Matters scoped in

Construction

7.3.20 The following have been assessed in relation to demolition, earthwork and construction activity:

a. the generation of dust, odour and elevated levels of particulate matter (PM_{10}, $PM_{2.5}$) arising from demolition and construction works;
b. increased journeys (construction related) to and from the Proposed Development on the road network; and
c. increased exhaust emissions from vehicles operating at the airport, airside and landside.

Operation

7.3.21 The following have been assessed in relation to the future operation of the Proposed Development:

a. increased staff and passenger journeys to and from the airport on the road network;
b. changes in emissions from aircraft engines;

c. changes in emissions from vehicles operating at the airport, airside and landside;

d. changes in emissions from energy and heating combustion plant;

e. miscellaneous emissions from other airport activities, such as aircraft fire training and engine testing; and

f. odour emissions from airside sources.

Matters scoped out

7.3.22 The impacts from jettisoning of fuel from aircraft have not been considered, following agreement in the scoping opinion from the Planning Inspectorate, and recorded in **Table 7.6**. The jettisoning of fuel from aircraft is only undertaken in emergency scenarios, when an aircraft is required to undertake an emergency landing. Jettisoning of fuel will usually occur over water and at high altitude in order to vaporise the fuel and facilitate dispersion. Due to the infrequency of these events, it is considered that there is no potential significant effect from these activities. In addition, the aircraft types that are typically used at the airport have no ability to jettison fuel.

7.3.23 The potential for air quality effects on rivers and flood storage areas due to deposition of pollutants has been scoped out (see **Table 7.6** above). The Proposed Development does not give rise to any stagnant or low flow conditions in any water body. No surface water flood storage areas are proposed, and those existing are for attenuation not permanent storage. The Proposed Development does not increase flood risk. Therefore, no significant effects are likely and these receptors are not considered further in this assessment.

7.4 Stakeholder engagement and consultation

7.4.1 Engagement in relation to air quality has been undertaken with a number of stakeholders. Engagement meetings with local authorities have been carried out over the past five years at key points where there was information ready to share and discuss. Open discussions with the environmental health officers at the local authorities has provided transparency for the assessment process and to gather local knowledge.

7.4.2 For air quality a working group was formed comprising representatives from:

a. Luton Borough Council (LBC);
b. Central Bedfordshire Council (CBC);
c. North Hertfordshire District Council (NHDC);
d. Aylesbury Vale District Council (AVDC), now part of Buckinghamshire County Council (BCC);
e. St Albans District Council (SADC); and
f. Stevenage District Council (SDC).

7.4.3 The **Consultation Report** submitted as part of the application for development consent (**[TR020001/APP/6.01]** and **[TR020001/APP/6.02]**) contains a full account of the previous statutory consultation process and issues raised in feedback. Matters raised regarding the scope, method or mitigation being considered as part of the air quality assessment were then subject to further discussions directly with stakeholders during working group meetings. The main matters/themes raised during consultation considered relevant to the air quality assessment were:

a. method of assessment including; assessment extent, receptor selection, and model verification;
b. mitigation options to minimise emissions associated with the airport; and
c. monitoring, existing and future requirements.

7.4.4 **Table 7.7** provides a summary of engagement with relevant stakeholders, undertaken to inform the EIA and this ES, including the date of meetings and a summary of discussions to resolve matters raised.

Table 7.7: Stakeholder engagement relating to air quality

Meeting name and date	Attendees (organisation)	Summary of discussion
Proposed Development-specific monitoring (various emails between February 2018 and January 2019)	LBC CBC NHDC The Applicant	The locations for Proposed Development-specific monitoring were discussed and agreed.

Meeting name and date	Attendees (organisation)	Summary of discussion
Environmental Health Officer (EHO) EIA Scoping Meeting 12 April 2018	NHDC CBC Apologies: LBC The Applicant	It was agreed that the LBC AQMAs (AQMA 1, 2 and 3), the CBC AQMA in Dunstable (AQMA 1) and the two NHDC AQMAs in Hitchin (Stevenage Road and Payne's Park) would be included in the assessment (see Figure 6.1, Volume 2 of the EIA Scoping Report (**Appendix 1.2 [TR020001/APP/5.05]**) if the traffic modelling data provided sufficient information. These AQMAs were included in the assessment following the receipt of final traffic data.
Air Quality Technical Stakeholder Meeting 11 January 2019	LBC CBC NHDC Apologies: AVDC The Applicant	The general approach and method of assessment was agreed. This included considering the odour impact, specifically from the work involving the landfill at Wigmore Valley Park. The need for assessment of intermediate scenarios, before the full operational year, was also agreed. Consideration of freight traffic as a result of the airport was also agreed.
Air Quality Technical Stakeholder Meeting 7 June 2019	LBC NHDC Apologies: CBC AVDC The Applicant	Actions from the previous meeting were discussed. Comments on the EIA Scoping Report were discussed and the assessment scenarios and extent of the modelled road network was agreed. The methodology of assessment was also agreed.
Air Quality Technical Stakeholders – 2020	LBC NHDC CBC AVDC The Applicant	The air quality group members were updated via email regarding changes to the programme and design during 2020. No meetings were held due to the programme changes.
Air Quality Technical Stakeholder Meeting 26 April 2021	LBC NHDC CBC BCC SDC SADC LLAOL The Applicant	Changes since the previous designs that stakeholders had been shown were presented. The stakeholders were introduced to the Green Controlled Growth (GCG) programme and how that would feed into the application for development consent. Technical air quality items from the statutory consultation were presented the following key points: a. assessment methodology – clarifying use of AQ guidance and other bespoke aspects;

Meeting name and date	Attendees (organisation)	Summary of discussion
		b. study area clarification; c. future baseline clarification; d. fleet mix assumptions used for modelling future aviation and traffic emissions; e. predicted air quality effects; f. sensitivity testing undertaken; g. predicted cumulative effects; and h. proposed mitigation and monitoring measures and their securing mechanisms. The methodology points were agreed by stakeholders. Actions from the meeting were around clarifying the highway interventions, traffic model reliability area, ARN and receptor selection.
LBC EHO meeting 30 September 2021	LBC	Meeting to discuss ongoing and future monitoring locations.
Air Quality Technical Stakeholder Meeting 8 July 2022	LBC SADC BCC The Applicant Apologies: NHDC CBC SDC	Comments raised following the publication of the PEIR and consultation feedback were discussed. Updates to the assessment methodology were also presented for discussion. An opportunity to discuss any additional questions or concerns was also provided. Technical air quality items from the statutory consultation were presented for the following key points: a. ecological assessment; b. health assessment; c. odour assessment; d. ultrafine particles; e. WHO air quality guidelines; and f. mitigation and GCG. The methodology points were agreed by stakeholders. Actions from the meeting were to share information about the GCG working group, to update the information on monitoring for the

Meeting name and date	Attendees (organisation)	Summary of discussion
		next Technical Working Group (TWG) meeting and to confirm if there is monitoring of traffic impacts as part of GCG. It was also agreed that early outcomes of modelling and verification would be discussed in next TWG meeting.
Air Quality Technical Stakeholder Meeting 27 October 2022	The following organisations have been invited: LBC SADC BCC NHDC CBC SDC The Applicant	This meeting was used to agree the methodology for future backgrounds used, updated from the PEIR, and the sifting criteria for the selection of GCG monitoring locations and the methodology of the GCG process for air quality.

7.5 Methodology

Overview

7.5.1 This section outlines the methodology employed for assessing the likely significant effects on air quality from the construction and operation of the Proposed Development. Full details of the methodology, including relevant assumptions and limitations, can be found in **Section 7.7** of **Appendix 7.1** to this ES **[TR020001/APP/5.02]**.

Baseline methodology

7.5.2 To provide an assessment of the significance of any new development proposal (in terms of air quality), it is necessary to identify and understand the baseline air quality conditions in and around the study area. The baseline year for this assessment is 2019. This provides a reference level against which any potential changes in air quality can be assessed. Since the baseline air quality is predicted to change in the future (mainly because vehicle emissions are changing and aircraft future fleets are expected to change), the future baseline situation has also been predicted for assessment Phase 1 (2027), Phase 2a (2039) and Phase 2b (2043) to present a reasonable worst-case assessment. The do-minimum (DM) scenario is the predicted future baseline for the relevant assessment years without the Proposed Development and includes any other proposed schemes with a high level of certainty of being built. Details of future baseline are provided in **Appendix 7.2** to this ES **[TR020001/APP/5.02]**, including those for sensitivity test scenarios, provided in **Appendix 7.4** to this ES **[TR020001/APP/5.02]**.

7.5.3 A desk-based review of the following data sources has been undertaken to determine baseline conditions of air quality in this assessment:

a. Department for Environment, Food & Rural Affairs (DEFRA) Air Quality Management Area (AQMA) website (Ref. 7.41);

b. data from monitoring surveys carried out by the local authorities, LLAOL and the Applicant;

c. Environment Agency Pollution Inventory website (Ref. 7.42);

d. Geographic Information System (GIS) locations of sensitive receptors (residential properties, schools, hospitals and care homes) from Ordnance Survey (OS) Address Base Plus data and satellite imagery; and

e. GIS boundaries of designated ecological sites from Natural England (Ref. 7.43) and;

f. GIS boundaries of locally designated ecological sites from Herts Environmental Records Centre and Bedfordshire & Luton Biodiversity Recording & Monitoring Centre.

7.5.4 A baseline monitoring survey to supplement the existing monitoring data has been undertaken and reported to 2021 in this ES, as the latest complete year of data. Monitoring was carried out following best practice guidance set by DEFRA

(Ref. 7.44) However, the survey has been continued beyond this. Passive diffusion tubes at five locations monitored volatile organic compounds (VOCs). Passive diffusion tubes at 11 locations monitored NO_2 (see **Figure 7.2** of this ES **[TR020001/APP/5.03]**). These pollutants were monitored as NO_2 is a key pollutant of concern and VOC monitoring was requested by local authorities in response to consultation questions from the public.

7.5.5 Monitoring has been set up at locations where there are gaps in the local authority monitoring around the airport, and at locations which could be used to support model verification.

7.5.6 An automatic monitoring station has been installed to monitor nitric oxide (NO) and nitrogen dioxide (NO_2), which are collectively referred to as NOx, fine particulate matter (PM_{10}, $PM_{2.5}$, PM_1), ozone (O_3), sulphur dioxide (SO_2), benzene, carbon monoxide (CO), black carbon, VOCs, naphthalene and toluene (see **Figure 7.2** of this ES **[TR020001/APP/5.03]**). This includes a range of potential pollutants wider than that monitored by any other major airport in the UK (Ref. 7.45).

7.5.7 The monitoring station collects data 24 hours a day, 7 days a week, 365 days per year (other than during any maintenance operations) and is published near real-time. The averaging time for each pollutant is 1-hour or less, so that the station is not just recording daily, weekly or monthly averages, and the data could be used to assess the variation in concentration on an hourly basis.

7.5.8 The approach to defining future baseline is described in **Section 5.4** of **Chapter 5** of this ES **[TR020001/APP/5.01].** The future baseline considered for air quality is described in **Section 7.7** of this chapter. The future baseline has been modelled using methodology detailed in **Appendix 7.1** of this ES **[TR020001/APP/5.02]**, referring to National Atmospheric Emissions Inventory (NAEI) gridded emissions (Ref. 7.46)**,** and airport related emissions, calculated for the future baseline scenarios.

7.5.9 The odour baseline was assessed using sniff testing methodology detailed in **Appendix 7.1** of this ES **[TR020001/APP/5.02]**.

Construction assessment methodology

Construction dust

7.5.10 The effects from demolition and construction of the Proposed Development have been assessed using the qualitative approach described in the latest guidance by the IAQM (Ref. 7.32).

7.5.11 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 Proposed Development are:

a. dust deposition, resulting in the soiling of surfaces;

b. visible dust plumes; and

c. elevated PM_{10} concentrations as a result of dust generating activities on site.

7.5.12 The IAQM guidance considers the potential for dust emissions from activities such as demolition of existing structures, earthworks, construction of new structures and trackout. 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 of the Proposed Development 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 dust 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.

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

a. annoyance due to dust soiling;

b. harm to ecological receptors; and

c. the risk of health effects due to a significant increase in PM_{10} exposure.

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

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

7.5.16 The full methodology for the assessment of construction dust is detailed in **Appendix 7.1** of this ES **[TR020001/APP/5.02]**.

Construction traffic

7.5.17 There will be off-site vehicle movements associated with the Proposed Development from deliveries and workers as detailed in **Appendix 7.1** of this ES **[TR020001/APP/5.02]**.

7.5.18 Impacts from changes to air pollutant concentrations as a result of additional road traffic have been predicted using Atmospheric Dispersion Modelling Software (ADMS). The specific dispersion model used was ADMS-Airport (Version 5.0.0.1) referred to as ADMS-Airport in this ES. The method of modelling, model verification and model set up are detailed in **Appendix 7.1** of this ES **[TR020001/APP/5.02]**.

7.5.19 The primary access route taken by construction traffic is assumed to come directly from the M1 (split 50 percent north and south of Junction 10 of the M1) and travel up the A1081 to the airport, following the Construction Method Statement and Programme Report (provided as **Appendix 4.1** to this ES

[TR020001/APP/5.02]). Therefore, this is considered the ARN for the construction traffic.

7.5.20 The construction traffic has been assessed in combination with operational traffic, because the phases assessed will have both construction and operational traffic occurring. The significance of effects has been calculated using the approach described in the IAQM/EPUK guidance (Ref. 7.33). The approach is detailed in **Appendix 7.1** of this ES **[TR020001/APP/5.02]**; it is likely that a 'moderate' or 'substantial' impact will give rise to a significant effect and a 'negligible' or 'slight' impact will not result in a significant effect.

Construction equipment and plant

7.5.21 There will be construction equipment used such as Non-Road Mobile Machinery (NRMM) and a proposed concrete batching plant, which will have related emissions of NOx, PM_{10} and $PM_{2.5}$. The NRMM and batching plant impacts will be sufficiently mitigated by measures including, but not limited to, locating away from sensitive receptors (Code of Construction Practice (CoCP) provided as **Appendix 4.2** of this ES **[TR020001/APP/5.02]**), increasing the release height of emissions for sufficient dispersion (if necessary), and relevant abatement technology. NRMM and concrete batching plant emissions have been assessed. The approach is detailed in **Appendix 7.1** of this ES **[TR020001/APP/5.02]**.

Operational assessment methodology

7.5.22 A review of sources of emissions associated with the existing airport and the Proposed Development during operation has been carried out. Data was gathered for the following pollution sources and emissions have been assessed using dispersion modelling:

a. aircraft main engines in the landing and take-off (LTO) phase, both at ground level and at height;
b. aircraft auxiliary power units (APUs);
c. ground support equipment (GSE), namely vehicles operating airside which are associated with aircraft turn-around and runway maintenance;
d. other airport sources, such as ground power units (GPUs), energy and heating plant, fire training ground and engine testing;
e. landside road vehicles on the local highway network; and
f. all background sources that are non-airport and major road related that are included in the NAEI (e.g. domestic heating).

7.5.23 Regarding vehicles on the highway network, two sets of traffic data for each assessment phase were provided by the transport team. One which considered the Local Transport Plans of relevant authorities (LTP traffic data) and one which used Web-based Transport Analysis Guidance (WebTAG) from Department for Transport (webTAG traffic data). Each of these have been assessed and results provided in **Appendix 7.3** of this ES **[TR020001/APP/5.02]**. The webTAG traffic has been used to provide results for the Core Planning Case assessment. Further details of the traffic growth

options are provided in **Chapter 18** Traffic and Transportation of this ES **[TR020001/APP/5.01]**.

7.5.24 The pollutants calculated from road traffic were NOx, NO_2, PM_{10}, $PM_{2.5}$ and ammonia (NH_3). NH_3 was calculated for inclusion in the ecological assessment methodology, as detailed in **Appendix 7.1** of this ES **[TR020001/APP/5.02]**.

7.5.25 The ADMS-Airport dispersion model has been used for assessment of operational emissions. The model takes into account all the relevant emissions sources on and off the airport and can allow for variations of each of the emission sources with time. Annual mean concentrations of NOx, NO_2, $PM_{10,}$ $PM_{2.5}$ and NH_3 were estimated for comparison with the relevant air quality standards and ecological assessment.

7.5.26 The initial air quality modelling included a verification of model-predicted concentrations against monitored values to determine whether the model output for future scenarios requires any adjustment to take into account systematic over- or under-predictions. Any required adjustment was then undertaken in accordance with DEFRA guidance (Ref. 7.31). The model verification results are detailed in **Appendix 7.2** of this ES **[TR020001/APP/5.02]**.

7.5.27 Pollutant concentrations have been predicted at a grid of receptors covering the 15km x 15km study area, and at discrete sensitive human and ecological receptors in the study area.

7.5.28 Full details of the modelling methodology and calculation of emissions along with any assumptions are provided in **Appendix 7.1** of this ES **[TR020001/APP/5.02]**.

7.5.29 The significance of effects has been calculated using the approach described in the IAQM/EPUK guidance (Ref. 7.33). The approach is detailed in **Appendix 7.1** of this ES **[TR020001/APP/5.02]**; it is likely that a ‘moderate’ or ‘substantial’ impact will give rise to a significant effect and a ‘negligible’ or ‘slight’ impact will not result in a significant effect.

Compliance risk assessment

7.5.30 DMRB LA 105 (Ref. 7.47) provides a method for the assessment of the risk of the compliance of a scheme against air quality standards. The compliance risk assessment is undertaken using the modelling results from the local air quality assessment. To undertake compliance risk assessment, the following information is required:

a. Local air quality modelled results.
b. DEFRA’s Pollution Climate Mapping (PCM) model outputs for the compliance road network (Ref. 7.48).
c. DEFRA’s zones and agglomerations maps (Ref. 7.49).

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

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

7.5.33 A review was carried out to identify any qualifying features as defined in section 2.64 of DMRB LA 105 and receptors added if they are within 15 metres. 66 receptors have been added along the PCM links and corresponding local model four metre validation points were added. Details of the receptors are provided in **Appendix 7.1** of this ES **[TR020001/APP/5.02]**.

7.5.34 To determine the compliance risk of the scheme, the Compliance Risk Flow Chart in Figure 2.79 of DMRB LA 105 has been followed.

Odour assessment methodology

7.5.35 It is recognised different sources of odour will affect receptors over different distances due to the varying strength and nature of emissions. An assessment has been carried out for all odour sources identified that could potentially have an impact on receptors (during the construction and operation phases).

7.5.36 During the proposed construction and earthworks, potentially contaminated soils and waste material may be exposed. This may temporarily generate potential dust and odours affecting human receptors off-site. Odour related to the construction works disturbing the historical landfill beneath Wigmore Valley Park has been considered in this assessment, as well as potential sources of odour in the Proposed Development.

7.5.37 During the operational phase aircraft emissions will be one of the key sources of odour. There is limited published information regarding the odour potential for volatile organic compound (VOC) emissions from aircraft engines that could potentially assist in the evaluation of potential odour annoyance. Odour perception and its potential to cause annoyance is also subjective and strongly dependent on the nature of the odour, the sensitivity or tolerance of those exposed and meteorological conditions. Experience of the assessment team suggest that a dispersion modelling approach to assessing potential changes in VOC concentrations would not enable an evaluation of potential odour effects and significance.

7.5.38 Therefore, in accordance with IAQM guidance (Ref. 7.37), the assessment of odour under operational scenarios has been undertaken using a Source Pathway Receptor assessment, sniff testing, a review of complaint data and consultation responses received on the PEIR published during statutory consultation in 2022. This allowed the pathway odour flux to receptor (e.g. distance and direction in relation to prevailing wind direction) and receptor sensitivity to be considered for the Proposed Development.

7.5.39 The methodology is detailed in **Appendix 7.1** to this ES **[TR020001/APP/5.02]**.

Health impact assessment methodology

7.5.40 It is acknowledged that there are no thresholds of effect at a population level identified for pollutants such as NO_2, PM_{10} and $PM_{2.5}$ (Ref. 7.50), so there are

health benefits to be gained from improving air quality even at concentrations below the standards. However, in order to determine the significance of impacts, the current legislated standards have been used, in line with the best practice guidance (Ref. 7.33). Health impact assessments consider the impacts at a population level. This air quality assessment considers the population affected by significant concentrations by assessing the impact at sensitive receptors representative of the population (receptors nearest to the ARN, airport and below the flightpath). Therefore, the assessment has indicated the population affected by significant concentrations in **Section 7.9**. However, the assessment of population health impacts, have been further considered in **Chapter 13** Health and Community of this ES **[TR020001/APP/5.01**], with the methodology described in that chapter.

7.6 Assumptions and limitations

7.6.1 A table summarising the assumptions required for the assessment is provided in **Appendix 7.1** of this ES **[TR020001/APP/5.02]**. Several assumptions have been made where the data supplied was incomplete, in order to complete a robust assessment for this ES.

Reasonable Worst Case

7.6.2 **Chapter 5** of this ES **[TR020001/APP/5.01]** describes the general approach adopted to ensure that a reasonable worst case is assumed in this assessment including the use of parameters, accounting for uncertainty, and incorporating flexibility in design and demand forecasts.

7.6.3 The following provides the relevant assumptions on the reasonable worst case specific to this assessment.

Construction phase

7.6.4 Due to the dynamic and transient nature of construction activities, the assessment of construction traffic emissions are based on the peak year of construction traffic that will occur during each construction phase.

7.6.5 The construction for each assessment phase is expected to occur during the following periods:

a. Assessment Phase 1 construction: 2025 to 2027. Peak construction traffic is expected in 2025;

b. Assessment Phase 2a construction: 2033 to 2036. Peak construction traffic is expected 2035; and

c. Assessment Phase 2b construction: 2037 to 2041. Peak construction traffic is expected 2040.

7.6.6 The construction traffic from the peak years for each assessment phase has then been added to the operational traffic for the year each assessment phase reaches its full passenger capacity (Assessment Phase 1: 2027 traffic; Assessment Phase 2a: 2039 traffic and Assessment Phase 2b: 2043 traffic). This approach ensures that any likely significant effects due to the combination of construction and operational activities are captured in the assessment and is considered to represent a reasonable worst case approach.

Operational phase

7.6.7 The following provides the relevant assumptions on the reasonable worst case specific to this assessment for the operational phase:

a. assuming Terminal 2 will use combustion plant for heating (considered to be conservative as Terminal 2 will not be supplied with natural gas);

b. assuming there will be no increase in electric vehicles or reduced proportions of pre-Euro 6/VI vehicles in the GSE fleet;

c. the vertical alignment of the Airport Access Road (AAR) (shown in **[TR020001/APP/4.9]**) has been modelled at ground level. This broadly represents the upper limit of the Limits of Deviation (LOD) for the road (as described in **Chapter 5** of this ES **[TR020001/APP/5.01])**, particularly at the sections closest to receptors located north of Eaton Green Road. This represents a reasonable worst case in terms of traffic emissions from the road to receptors;

d. assuming GPU emission increase without consideration of Terminal 2 including Fixed Electric Ground Power (FEGP); and

e. assuming no continued improvement in future background concentrations beyond 2030 based on NAEI emissions and using DEFRA predictions (details in **Appendix 7.2** of this ES **[TR020001/APP/5.02]**).

7.6.8 As the measures described above would be implemented and would reduce emissions to air from the Proposed Development this approach represents a reasonable worst case for operational air quality, as emissions would be less than reported in this assessment. In addition, to ensure that the approach to defining a reasonable worst case is robust, sensitivity testing was undertaken to determine the potential for greater impacts if demand levels are achieved more quickly or slowly and having regard for the potential for delays to the transition to new aircraft. Sensitivity tests are discussed in **Section 7.9**.

7.7 Baseline conditions

7.7.1 This section provides a description of the existing and future air quality conditions in the study area. Existing or baseline ambient air quality refers to the concentration 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.

Existing conditions

Sources of air pollution

7.7.2 Industrial air pollution sources are regulated through a system of operating permits or authorisations, requiring stringent emission limits to be met and ensuring that any releases to the environment are minimised or rendered harmless. Regulated (or prescribed) industrial processes are classified as Part A (Part A1 and A2) or Part B processes and are regulated through the Environmental Permitting system (Ref. 7.51). A review of sources of air pollution in the study area identified there are no Part A1 industrial processes within 10km of the Proposed Development. Part A2 and Part B processes in the study area are not considered to be significant point sources of emissions and impacts from these sources is taken into account within the background concentrations included in the assessment.

7.7.3 All other key sources, roads, aircraft, airport operations have been explicitly assessed.

Local air quality management

7.7.4 The Environment Act 1995 (Ref. 7.9) required local authorities to review and assess air quality with respect to the standards for seven pollutants specified in the National Air Quality Strategy. Local authorities are required to carry out an assessment and an Annual Status Report (ASR). If the ASR identifies potential hotspot areas likely to exceed air quality standards, then a detailed assessment of those areas is required. Where standards are predicted not to be met, local authorities must declare the area as an AQMA. In addition, local authorities are required to produce an Air Quality Action Plan (AQAP) which includes measures to improve air quality within the AQMA.

7.7.5 Details of AQMAs declared in the study area are provided in **Table 7.8**. The location of the AQMAs in relation to the Proposed Development are shown in **Figure 7.3** of this ES **[TR020001/APP/5.03]**.

Table 7.8: AQMA details and NO_2 monitoring results

Details of AQMAs
Luton AQMA 1 (in the 15x15km study area) Declared in 2003 due to exceedances of the NO_2 annual mean standard. The current AQMA includes residential properties on the eastern side of the M1 motorway near Junction 11.

Details of AQMAs
There are no monitoring locations in the AQMA. The nearest site is LN82. No exceedances were recorded at LN82 of the NO_2 annual mean standard from 2017 to 2021. LN82 recorded an annual mean NO_2 concentration of 28µg/m^3 in 2019, which is below the annual mean standard.
Luton AQMA 2 (in the 15x15km study area) Declared in 2005 due to exceedances of the NO_2 annual mean standard. The AQMA also includes residential properties either side of the M1 motorway near Junction 11, but south of AQMA 1. There are nine monitoring locations in the AQMA (LN15 to LN18, LN81 to LN86). In 2019 none of the locations recorded exceedances of the NO_2 annual mean standard.
Luton AQMA 3 (in the 15x15km study area) Declared in 2016 due to exceedances of the NO_2 annual mean standard. The AQMA extends from Dunstable Road (A505) near the junction with Kenilworth Road through to Stuart Street and Chapel Viaduct by Latimer Road, including Castle Street to Holly Street and Telford Way. There are five monitoring locations in the AQMA (LN52, LN61 to LN63, LN66). LN52 and LN61 to LN63 have recorded exceedances in 2017 and just LN52 recorded exceedances in 2019.
CBC AQMA 1 Dunstable (in the 15x15km study area) Declared in 2005 due to exceedances of the NO_2 annual mean standard. The AQMA extends from High Street North (A505), through Dunstable town centre to Borough Road (A5183). It also includes West Street (B489) from St Marys Gate, through the town centre to the junction of Church Street (A505), Poynters Road and Dunstable Road (A505). There are seven monitoring sites in the AQMA (sites 1, 18, 27, 33, 34, 36 and 37) and three located close to the AQMA boundary (sites 50, 55 and 57). Sites 1 and 50 recorded an exceedance of the annual mean standard in 2019 (43.4 and 42.1µg/m^3 respectively).
NHDC AQMA Stevenage Road (in the 15x15km study area) Declared in 2012 due to exceedances of the NO_2 annual mean standard. The AQMA is located along a section of Stevenage Road, Hitchin and includes properties on the south side of the road. There are eight diffusion tube monitoring sites in the AQMA (NH45, NH92, NH103 to NH105, NH110 to NH112). Sites NH92, NH110, NH111 and NH112 recorded exceedances of the NO_2 annual mean standard, which range from 42µg/m^3 to 50.7µg/m^3 from 2017 to 2019.
NHDC AQMA Paynes Park (in the 15x15km study area) Declared in 2017 due to exceedances of the NO_2 annual mean standard. The AQMA is located along the roads surrounding Paynes Park Roundabout in Hitchin. There five monitoring locations in the AQMA (NH63, NH77, NH82, NH93 and NH114). Only NH93 recorded exceedances of the annual mean standard from 2017 to 2019.
St Albans City and District Council AQMA No. 2 (on the extended road network outside of the 15x15km study area)

Details of AQMAs
Declared in 2004 due to exceedances of the NO_2 annual mean standard. The AQMA is located 15km south of the airport, along the M1. There is one roadside monitoring location in the AQMA (SA142) at the relevant residential receptor, which was installed in 2017. The site recorded 30.4µg/m^3 in 2019 which is below the annual mean standard.

Local monitoring data

7.7.6 Details of air quality monitoring in the study area including Proposed Development specific monitoring and monitoring carried out by London Luton Airport Operations Ltd (LLAOL) (the current operator of the airport) and local authorities are provided in **Appendix 7.2** of this ES **[TR020001/APP/5.02]**.

7.7.7 Monitoring close to the airport has identified a number of locations exceeding the air quality standard for annual mean NO_2, however none of the locations are representative of where people would be exposed for durations relevant to the annual mean standard. All locations representative of receptors sensitive to long-term exposure to NO_2, are below the air quality standard for annual mean NO_2. Monitoring of NO_2 across the study area identified a number of locations in existing AQMAs where concentrations exceed the annual mean air quality standard. No automatic monitoring sites recorded any exceedances of the short term NO_2 standard and no diffusion tubes in the study area recorded concentrations above 60µg/m^3 (the value which could indicate risk of exceedance of the short-term standard).

7.7.8 All concentrations of PM_{10} and $PM_{2.5}$ recorded were below the relevant standards in 2019.

7.7.9 All concentrations of VOCs were well below the relevant standards in the study area.

7.7.10 All other concentrations of pollutants monitored (SO_2, CO) were well below the relevant standards, other than for O_3 where one exceedance of a short-term standard was noted. However, ozone is a trans-boundary pollutant which is formed in the atmosphere from reactions involving other pollutants. Monitoring from across the UK has shown similar results and it can be concluded that this exceedance is not attributed to a local source.

7.7.11 In summary, NO_2 is the only pollutant influenced by local sources of emissions which is exceeding the standards in the study area.

Background concentrations

7.7.12 The background air quality has been modelled using rural background concentrations and gridded emissions. Details of the gridded emissions are provided in this section.

7.7.13 Background concentrations refer to the existing levels of pollution in the atmosphere, produced by a variety of stationary and nonstationary sources, such as roads and industrial processes.

7.7.14 An inventory of background emissions was compiled using gridded pollutant emissions. The data was taken from the NAEI (2019 based emissions). The data was in the form of gridded emissions for 1x1km squares, broken down by pollutant and by sector. The emissions were modelled using ADMS-Airport over a 60km by 50km grid area (centred on the study area) at a 1km resolution, to model the impact of diffuse sources on background concentrations in the vicinity of the airport. ADMS-Airport can model up to 3,000 1km grid cells; it is considered this area is sufficient to capture all background effects that would influence the background concentrations in the 15km by 15km study area. The resulting background concentrations were then added to concentrations recorded at rural background monitoring stations to generate hourly varying total background concentrations for the study area.

7.7.15 Three rural background monitoring stations were selected for the modelling of background NOx: Wicken Fen 65km to the north east, Rochester Stoke approximately 85km to the south east, and Chilbolton 110km to the south west of the airport respectively. For the modelling of background PM, two rural background monitoring stations were selected: Rochester Stoke and Chilbolton. These were selected as the nearest sites with suitable data capture. These are part of DEFRA's automatic urban and rural network (AURN) for monitoring.

7.7.16 The contribution of rural monitoring data to the background concentration was made on an hourly basis depending on wind direction. For background modelling of NOx, when the wind was from the north east, the background NOx data from Wicken Fen was used; when the wind was from the south east, the background NOx data from Rochester Stoke was used; and when the wind was from the south west, the background NOx data from Chilbolton was used. For background modelling of PM, when the wind was from the east, the background PM and ozone data from Rochester Stoke was used; and when the wind was from the west, the background PM and ozone data for Chilbolton was used.

7.7.17 **Figure 7.4** of this ES **[TR020001/APP/5.03]** shows the location of AURN sites selected and the NAEI gridded emissions area.

7.7.18 The modelled background concentrations for 2019 were compared with the measured concentrations from the urban background monitoring stations carried out by LBC for 2019. Site suitability was assessed and only sites where the location was confirmed, and it was considered concentrations were not influenced by a specific source, were selected.

7.7.19 **Appendix 7.2** of this ES **[TR020001/APP/5.02]** provides the results of the comparison which show there is a good agreement between modelled and monitored background concentrations.

DEFRA Pollution Climate Mapping (PCM) modelling

7.7.20 Predicted roadside NO_2 concentrations were obtained from DEFRA's PCM model for the years 2019 (2018 reference year baseline projection) and 2027 (2018 reference year) and 2030 (to represent 2038 and 2043). The modelled road network overlaps with 32 PCM links. DEFRA PCM mapping indicates no exceedances in 2019 at any of these road links. In 2028 and 2030, DEFRA PCM mapping indicates all links would still comply with air quality standards.

Odour baseline

7.7.21 Sniff testing around the Proposed Development area was undertaken to assess the odour risk from potential sources. The details of the methodology and results are provided in **Appendix 7.1** and **Appendix 7.3** of this ES **[TR020001/APP/5.02]**, respectively.

Future baseline

7.7.22 In the absence of the Proposed Development, there is likely to be a change to the future baseline conditions as a result of other factors and developments in proximity. These are the conditions that will prevail 'Without Development' in place. The 'Without Development' scenario is used, where appropriate, as a comparator for the assessed case, to show the effect of the Proposed Development against an appropriate reference point. The approach to defining future baseline and the developments identified for consideration are described in **Section 5.4** of **Chapter 5** of this ES **[TR020001/APP/5.01]**.

7.7.23 The future traffic data along the road network 'Without Development' (referred to as the Do-Minimum (DM) scenario) has been modelled along with airport sources based on the aircraft fleet forecasts 'Without Development' (DM scenario). The background emissions modelling for 2019 have been used along with DEFRA predicted trends for the calculation of background concentrations in future scenarios. DEFRA publishes predicted background concentrations to 2030 (Ref. 7.52). These have been used to adjust the 2019 modelled background concentrations (from NAEI emissions) to future years, in line with the DEFRA predicted trends. Details are provided in **Appendix 7.1** and **Appendix 7.2** of this ES **[TR020001/APP/5.02]**. The total of these modelling results provides the future baseline concentrations of NOx, NO_2, PM_{10} and $PM_{2.5}$ (the DM scenarios) and are presented in **Appendix 7.3** in of this ES **[TR020001/APP/5.02]**.

7.7.24 Long term air quality trends in the UK have shown a reduction in emissions as legislation and technology have resulted in lower emissions from industry and vehicles. It is expected that emissions will continue to reduce in future with a shift to electric vehicles and with improvements in aircraft emissions in line with Government ambitions set out in the Transport Decarbonisation Plan (Ref. 7.53) and Jet Zero Strategy (Ref. 7.22).

7.8 Embedded and good practice mitigation measures

7.8.1 This section describes the embedded and good practice mitigation for air quality that has been incorporated into the Proposed Development design or assumed to be in place before undertaking the assessment. A definition of these classifications of mitigation and how they are considered in the EIA is provided in **Chapter 5** of this ES **[TR020001/APP/5.01]**.

Embedded

7.8.2 A summary of measures that have been embedded into the design of the Proposed Development are set out below.

7.8.3 This section outlines the embedded mitigation which has been assumed to be in place for the purpose of this assessment. The assumptions have been made based on data gathered to date, an understanding of the Proposed Development, and experience of other aviation projects.

7.8.4 Embedded mitigation for construction includes:

a. phased working to reduce the magnitude and extent of air quality impacts in comparison to undertaking all works at the same time; and

b. odorous material will be covered over regularly if works are on-going to avoid release of unpleasant odours.

7.8.5 Embedded mitigation for operation includes:

a. use of the new AAR to provide routes for operational road traffic and construction traffic, away from sensitive receptors; and

b. the Proposed Development includes a new fuel pipeline connection which will reduce the number of heavy goods vehicles (HGVs) delivering fuel to the Proposed Development, and the related emissions.

Good Practice

7.8.6 Good practice for construction is to follow the IAQM guidance for control of dust and construction emissions. Construction good practice measures are given in the Code of Construction Practice (CoCP) provided as **Appendix 4.2** of this ES **[TR020001/APP/5.02]** and in the Outline Operational Air Quality Plan provided as **Appendix 7.5** of this ES **[TR020001/APP/5.02]**.

7.8.7 Operational good practice mitigation measures are also recommended in the Outline Operational Air Quality Plan (**Appendix 7.5** of this ES **[TR020001/APP/5.02]**). Good practice for the operational phase is to consider how to reduce road transport movements as far as possible; provide and incentivise use of electric vehicles; and to monitor air quality around the airport.

7.9 Assessment

7.9.1 This section presents the results for the assessment of the Core Planning Case for likely significant effects with the embedded and good practice mitigation measures, described in the previous section, in place. Results for the sensitivity test scenarios are summarised from **paragraph 7.9.57**.

7.9.2 The results are summarised here for each assessment phase, with consideration of the results from modelling the WebTAG traffic data and LTP traffic data.

7.9.3 A summary of the assessment of effects is provided on **Table 7.12** in **Section 7.14**. The effects are discussed in further detail in this section. Contour plots of the total concentrations of NO_2, PM_{10} and $PM_{2.5}$ are also provided for all three assessment scenarios with the Proposed Development in **Figure 7.41** to **Figure 7.49** of this ES **[TR020001/APP/5.03]**

Construction effects

Construction dust

7.9.4 The construction effects from assessment Phase 1, Phase 2a and Phase 2b have been assessed following the IAQM methodology (Ref. 7.32). The level of dust risk to dust soiling and human health during each assessment phase at the Main Application Site has been summarised in **Table 7.9**. The risks at Off-site Car Parks and Highway Interventions (as defined in **Chapter 2** of this ES **[TR020001/APP/5.01])** are provided in **Appendix 7.3** of this ES **[TR020001/APP/5.02]**.

Table 7.9: Summary of construction dust effects

Assessment Phase	Dust soiling	Human health
Assessment Phase 1	High	Medium
Assessment Phase 2a	High	Medium
Assessment Phase 2b	High	Medium

7.9.5 Due to the risks identified, without applying mitigation measures, there would be potential for a **significant effect**. Therefore, mitigation measures for high risk sites have been set out in the CoCP provided as **Appendix 4.2** of this ES **[TR020001/APP/5.02]**, and it is recommended that the high risk mitigation measures are considered during all three assessment phases. These measures are considered to be good practices and following the implementation of this appropriate mitigation, the effects of construction on dust soiling and human health would be **negligible** and the impacts would therefore be **not significant,** in line with IAQM guidance (Ref. 7.32).

Construction equipment and plant

7.9.6 NRMM and a potential batching plant have been assessed as described in **Section 7.5**. The potential impacts will be mitigated by measures including, but not limited to, locating away from sensitive receptors, increasing the release

height of emissions for sufficient dispersion, and relevant abatement technology. The emissions from these sources have been assessed in the results provided in **Appendix 7.3** of this ES **[TR020001/APP/5.02]**, summarised below, as construction and operation has been assessed as a combined scenario to provide a conservative assessment of the future scenarios.

Operational effects

Assessment Phase 1

Modelled concentrations at human receptors

7.9.7 Full results for both WebTAG traffic data and LTP traffic data are provided in **Appendix 7.3** of this ES **[TR020001/APP/5.02]**. The worst case results occur with the WebTAG traffic data (on average, the traffic data results in the greatest change as a result of the Proposed Development) and are summarised below.

7.9.8 Pollutant concentrations for annual mean NO_2 predicted at 601 sensitive human receptors (including the two heritage receptors identified in **Appendix 7.2** in this ES **[TR020001/APP/5.02]**) resulted in a predicted **negligible** magnitude of change for all receptors.

7.9.9 The maximum change is seen at receptor H133 (located on the Dunstable Road (A505) at the Poynters Road Roundabout), the locations of which are shown in **Figure 7.3** of this ES **[TR020001/APP/5.03]**. The change in concentrations predicted at this receptor was 0.8µg/m³ with a maximum total concentration of 29.3µg/m³, which is below the annual mean standard (40µg/m³). This was also the maximum predicted change at all human receptors assessed.

7.9.10 No locations are predicted to exceed the annual mean standard in 2027. The maximum predicted concentration was 29.7µg/m^3 at receptor H414 adjacent to the M1.

7.9.11 Changes to annual mean PM_{10} are predicted to be **negligible** at all receptors and all concentrations are below the air quality standards.

7.9.12 Annual Mean $PM_{2.5}$ concentrations are above the air quality standard of 10µg/m^3 (to be achieved by 2040) across the study area in the DM and DS scenarios with a maximum concentration of 11.6 predicted at receptor H247 (located along the A505). Changes to annual mean $PM_{2.5}$ are predicted to be **negligible** at all receptors with the exception of receptors H26, H133, H286, and H333 (located adjacent to Poynters Road roundabout) where a **moderate beneficial** change is predicted.

7.9.13 Therefore, the effects of NO_2, PM_{10} and $PM_{2.5}$ at human receptors, as a result of the Proposed Development, are predicted to be **not significant**.

Modelled concentrations at ecological receptors

7.9.14 Pollutant concentrations for annual mean NOx are predicted at 129 sensitive ecological receptors, 22 receptors are predicted to experience concentrations above the annual mean standard of 30µg/m^3. These concentrations occur in both the with and without Proposed Development scenarios. The change in

annual mean NOx is negligible for 16 of the sites, as the change is less than 1% of the critical level[1]. However, the following receptors are predicted to receive a change of more than 1% of the critical level:

a. Ecological receptor E13 Kidney/Bulls Wood AW (change of 1.2µg/m^3);
b. Ecological receptor E29 Luton Hoo Park LWS (change of 1.1µg/m^3);
c. Ecological receptor E32 Vauxhall Way LWS (change of 2.7µg/m^3);
d. Ecological receptor E49 Kidney and Bull Woods LWS (change of 0.7µg/m^3);
e. Ecological receptor E114 Luton Hoo Park LWS, River Lea CWS (change of 0.8µg/m^3); and
f. Ecological receptor E119 Dairybon Scarp LWS (change of 1.6µg/m^3).

7.9.15 As these changes are greater than 1% of the critical level the results have been passed to the project ecologist to determine significance, in line with the methodology detailed in **Appendix 7.1** of this ES **[TR020001/APP/5.02]**.

7.9.16 The change in nitrogen deposition (as a result of NOx and ammonia emissions) at each ecological site has also been calculated and the change as a result of the Proposed Development is above 1% of the lower critical load[2] at the following 17 receptors:

a. E5 Winch Hill Wood AW, LWS (change of 4.0% of lower critical load);
b. E13 Kidney/Bulls Wood AW (change of 11.9% of lower critical load);
c. E29 Luton Hoo Park LWS (change of 9.8% of lower critical load);
d. E30 Church Cemetery, Luton LWS (change of 1.8% of lower critical load);
e. E32 Vauxhall Way LWS (change of 1.8% of lower critical load);
f. E33 Hitchin Road Spinney LWS (change of 16.8% of lower critical load);
g. E37 Slaughters Wood and Green Lane LWS (change of 1.5% of lower critical load);
h. E39 Burnt Wood LWS (change of 2% of lower critical load);
i. E40 Limekiiln Wood LWS (change of 1.5% of lower critical load);
j. E62 Riverside Walk LWS (change of 5.1% of lower critical load);
k. E63 Honeygate and Crick Hills LWS (change of 6.0% of lower critical load);
l. E65 Croda Colloids LWS, River Lea LWS (change of 1.3% of lower critical load);

[1] The critical level is defined as the concentrations of pollutants in the atmosphere above which direct adverse effects on receptors, such as human beings, plants, ecosystems or materials, may occur according to present knowledge.
[2] The critical load is defined 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. The lower critical load is the smallest amount of deposited pollutant which could result in a significant harmful effect.

m. E114 Luton Hoo Park LWS, River Lea CWS (change of 5.6% of lower critical load);
n. E119 Dairybon Scarp LWS (change of 12.7% of lower critical load);
o. E120 Wigmore Park LWS (change of 2.6% of lower critical load);
p. E121 Wigmore Park LWS (change of 6.6% of lower critical load); and
q. E128 Luton Parkway Verges DWS (change of 1.4% of lower critical load).

7.9.17 As these changes are greater than 1% of the critical load the results have been passed to the project ecologist to determine significance. All other sites have a change of less than 1% compared to the lower critical load and are therefore considered to be **insignificant**.

7.9.18 The significance of changes above 1% of the lower critical load are evaluated in **Section 8.9** of **Chapter 8** of this ES **[TR020001/APP/5.01]**.

Assessment Phase 2a

Modelled concentrations at human receptors

7.9.19 Full results for both WebTAG traffic data and LTP traffic data are provided in **Appendix 7.3** of this ES **[TR020001/APP/5.02]**. The worst case results occur with the WebTAG traffic data and are summarised below.

7.9.20 Pollutant concentrations for annual mean NO_2 predicted at 601 sensitive human receptors (including the heritage receptors) resulted in a predicted **slight adverse** impact at one receptor, H299 (Dane Street) and **negligible** magnitude of change for the other receptors.

7.9.21 The receptor where the maximum impact was predicted, was H299. The change in concentrations predicted at this receptor was 2.3µg/m^3 with a maximum total concentration of 16.5µg/m^3, which is below the annual mean standard (40µg/m^3).

7.9.22 No locations are predicted to exceed the annual mean standard in 2039. The maximum predicted concentration was 25.0µg/m^3 at receptor H247 (located on Stuart Street in central Luton, west of the airport).

7.9.23 Changes to annual mean PM_{10} are predicted to be **negligible** at all receptors and all concentrations are below the air quality standards.

7.9.24 Annual Mean $PM_{2.5}$ concentrations are above the air quality standard of 10µg/m^3 (to be achieved by 2040) across the study area in the DM and DS scenarios with a maximum concentration of 11.6 predicted at receptor H247 (located along the A505). Changes to annual mean $PM_{2.5}$ are predicted to be **negligible** at all receptors.

7.9.25 Therefore, the effects of NO_2, PM_{10} and $PM_{2.5}$ at human receptors, as a result of the Proposed Development, are predicted to be **not significant**.

Modelled concentrations at ecological receptors

7.9.26 Pollutant concentrations for annual mean NOx are predicted at 129 sensitive ecological receptors, 11 receptors are predicted to experience concentrations above the annual mean standard of 30µg/m^3. These concentrations occur in both the with and without Proposed Development scenarios. The change in annual mean NOx is **negligible** for eight of the sites as the change is less than 1% of the critical level. However, the following receptors are predicted to receive a change of more than 1% of the critical level:

a. E29 Luton Hoo Park LWS (change of 1.4µg/m^3);
b. E35 River Lea LWS (change of 0.4µg/m^3); and
c. E119 Dairybon Scarp LWS (change of 2.1µg/m^3).

7.9.27 As these changes are greater than 1% of the critical level the results have been passed to the project ecologist to determine significance, in line with the methodology detailed in **Appendix 7.1** this ES **[TR020001/APP/5.02]**.

7.9.28 The change in nitrogen deposition at each ecological site have also been calculated and the change as a result of the Proposed Development is above 1% of the lower critical load at 45 receptor locations, the details of which are provided in **Appendix 7.3** of this ES **[TR020001/APP/5.02]**. The greatest change was predicted at the following location:

a. E13 Kidney/Bulls Wood AW (change of 18.7% of lower critical load).

7.9.29 As the changes at 45 ecological sites are greater than 1% of the critical level the results have been passed to the project ecologist to determine significance. All other sites have a change of less than 1% compared to the lower critical load and are therefore considered to be **insignificant**.

7.9.30 The significance of changes is evaluated in **Section 8.9** of **Chapter 8** of this ES **[TR020001/APP/5.01]**.

Assessment Phase 2b

Modelled concentrations at human receptors

7.9.31 Full results for both WebTAG traffic data and LTP traffic data are provided in **Appendix 7.3** of this ES **[TR020001/APP/5.02]**.

7.9.32 Pollutant concentrations for annual mean NO_2 predicted at 601 sensitive human receptors (including the heritage receptor) resulted in **slight adverse** impacts at two receptors, H44 (located at Winch Hill, east of the airport) and H299 (Dane Street) and a predicted **negligible** magnitude of change for the other receptors.

7.9.33 The receptor where the maximum impact was predicted, was H299. The change in concentrations predicted at this receptor was 3.4µg/m^3 with a maximum total concentration of 17.7µg/m^3, which is below the annual mean standard (40µg/m^3).

7.9.34 All concentrations predicted at future receptors are below the annual mean standard (40µg/m^3). The maximum predicted concentration was 24.6µg/m^3 at receptor H414.

7.9.35 Changes to annual mean PM_{10} are predicted to be **negligible** at all receptors and all concentrations are below the air quality standards.

7.9.36 Annual Mean $PM_{2.5}$ concentrations are above the air quality standard of 10µg/m^3 (to be achieved by 2040) across the study area in the DM and DS scenarios with a maximum concentration of 11.6 predicted at receptor H247 (located along the A505). Changes to annual mean $PM_{2.5}$ are predicted to be **negligible** at all receptors with the exception of receptor H270 (located on Park Way, Hitchin) where a slight adverse change is predicted, Receptors H42, H298 (located on Wigmore Lane) and H301 and H431 (located on Eaton Green Road) where a slight beneficial change is predicted and receptors H51, H57, and H362 (located on Eaton Green Road) and H234 (located on Wigmore Lane) and where a **moderate beneficial** change is predicted.

7.9.37 Therefore, the effects of NO_2, PM_{10} and $PM_{2.5}$ at human receptors, as a result of the Proposed Development, are predicted to be **not significant**.

Modelled concentrations at ecological receptors

7.9.38 Pollutant concentrations for annual mean NOx are predicted at 122 sensitive ecological receptors, 12 receptors are predicted to experience concentrations above the annual mean standard of 30µg/m^3. These concentrations occur in both the with and without Proposed Development scenarios. The change in annual mean NOx is negligible for six of the sites. However, the following receptors are predicted to receive a change of more than 1% of the critical level:

a. E29 Luton Hoo Park LWS (change of 1.9µg/m^3);
b. E32 Vauxhall Way LWS (change of 0.4µg/m^3);
c. E81 Kingshoe Wood LWS (change of 0.4µg/m^3);
d. E85 River Flit LWS (change of 1.0µg/m^3);
e. E119 Dairybon Scarp LWS (change of 2.9µg/m^3); and
f. E121 Wigmore Park LWS (change of 16.1µg/m^3).

7.9.39 The change in nitrogen deposition at each ecological site has also been calculated and the change as a result of the Proposed Development is above 1% of the lower critical load at 57 receptor locations, the details of which are provided in **Appendix 7.3** of this ES **[TR020001/APP/5.02]**. The greatest change was predicted at the following location:

a. E121 Icknield Way below Telegraph Hill LWS (change of 31.7% of lower critical load).

7.9.40 As the changes are greater than 1% of the critical level the results have been passed to the project ecologist to determine significance. All other sites have a change of less than 1% compared to the lower critical load and are therefore considered to be **insignificant**.

7.9.41 The significance of changes at sites with a change greater than 1% are evaluated in **Section 8.9** of **Chapter 8** of this ES **[TR020001/APP/5.01]**.

Compliance

7.9.42 The predicted total concentrations in each assessment phase are provided in **Appendix 7.3** of this ES **[TR020001/APP/5.02]**. The results show that the Proposed Development is not predicted to impact compliance with the air quality standards.

Odour effects

7.9.43 This section provides the result of the Source Pathway Receptor assessment for each assessment phase. Results from the sniff testing along with complaint records and consultation feedback have then been used to review the overall risk of odour impacts associated with the Proposed Development.

Assessment Phase 1

7.9.44 The Source Pathway Receptor assessment predicted a maximum of a medium odour risk from the apron as a result of aircraft related emissions and from potential odours from the works at the historical landfill. Full details are provided in **Appendix 7.3** of this ES **[TR020001/APP/5.02]**. Operational odour mitigation measures are provided in **Appendix 7.5** of this ES **[TR020001/APP/5.02]**.

7.9.45 Potential construction odours (e.g. landfill odours) will be mitigated by the measures described in the CoCP provided as **Appendix 4.2** of this ES **[TR020001/APP/5.02]**.

Assessment Phase 2a

7.9.46 The Source Pathway Receptor assessment predicted a maximum of a medium odour risk from the apron as a result of aircraft emissions (changes to the apron), the new fuel farm to the east of the apron, and from potential odours from the works at the historical landfill. Operational odour mitigation measures are provided in **Appendix 7.5** of this ES **[TR020001/APP/5.02]**.

7.9.47 Potential construction odours (e.g. landfill odours) will be mitigated by the measures described in the CoCP provided as **Appendix 4.2** of this ES **[TR020001/APP/5.02]**.

Assessment Phase 2b

7.9.48 The Source Pathway Receptor assessment predicted a maximum of a medium odour risk from the apron as a result of aircraft emission (relocating the ERUB to the final location and changes to the apron), the new fuel farm to the east of the apron and the new fire training ground south of the runway. Full details are provided in **Appendix 7.3** of this ES **[TR020001/APP/5.02]**.

Odour risk

7.9.49 As noted in the IAQM guidance (Ref. 7.37) it is recommended to draw together a multi-tool approach to assess odour risk. This section therefore provides a

review of the Source Pathway Receptor assessment along with results from the sniff testing, complaints data and consultation feedback.

7.9.50 Having identified the airport as having medium risk sources, the approach to assess overall risk has been determined following the method set out in the IAQM guidance (Ref. 7.37). The Source Pathway Receptors assessment identified potential for **slight adverse** effects at areas to the north east and south of the airport due to the pathway effectiveness, distance to receptor and source of emissions.

7.9.51 The sniff testing results (**Appendix 7.3** of this ES **[TR020001/APP/5.02]**) show the majority of sites recorded a negligible impact from odours during the visits. There were two locations (site 4 on 4/5/22 and site 5 on 30/9/22) where **slight adverse** odours were recorded. On both occasions the distinct odour detected was from road vehicle emissions.

7.9.52 Site visit four also noted odours which were detected intermittently (but with high intensity) at the Wigmore Valley Park location. The distinct odour was aviation emissions and airplane taxiing movements could be seen to be occurring at the same time at the north east area of the airport. There was a strong south westerly intermittent breeze on that occasion. The overall duration of the intensity was limited (5-10 seconds), hence the overall outcome of negligible effect on that visit.

7.9.53 A summary of complaint data is provided in **Appendix 7.3** of this ES **[TR020001/APP/5.02]**. The data shows 12 complaints about odour from 2019 to November 2022 have been received by the airport operator or local authority (six per year on average). It is acknowledged that a low volume of complaints does not necessarily prove there is no annoyance or nuisance, or loss of amenity. Complaints tend to represent an expression of concern over odour exposure which has been experienced over a much longer period of time.

7.9.54 Feedback received as part of statutory consultation in 2022 included 39 mentions of ‘smells’ or odour associated with the airport. Not all mentions were site specific, however three mentions of odours being noted in the Wigmore area were reported along with other mentions of aviation smells from the airport being noted further afield in Breachwood Green, Kimpton and St Albans. Whilst the consultation is not a formal odour community-based tool providing details such as days or time on which odour was detected above a given intensity, it can provide a useful note on the potential odour risk. It indicated communities to the north east of the airport are most likely to experience odour from airport activities.

7.9.55 The risk-based assessment shows that community areas towards the south west of the airport are less likely to have odour emissions dispersed towards them. This is because prevailing winds at Luton are predominantly from the south west. Generally, the level of odour impacts will decrease with increasing distance from the source, i.e. those areas closest to the airfield activity introduced around the north east of the airport have the potential to experience higher odour impacts than those at greater distance.

7.9.56 The Proposed Development would increase aircraft movements and generate potential odour impacts over a wider area (and often further from receptors) than at present due to the increased airside activity and new stands.

7.9.57 It is possible that local communities (such as the Wigmore area) may experience occasional, short-term odour under specific weather conditions as a result of the increase in aircraft activity. At present, a limited number of complaints in relation to aviation fuel odour are currently received by the airport (6 per year on average). The number of odour complaints is considered likely to remain at a limited level due to the low frequency of the necessary meteorological conditions and medium odour source potential. The conditions when odour risk is raised do not occur during 80% of operational hours. The sniff testing carried out represented a range of conditions, with most being carried out under typical conditions when no aviation odour was detected. The future design increases the built environment between the apron and residential locations, this will increase air turbulence compared to the current Wigmore Park and increasing mixing of air which can have an effect on reducing odour. This effect is therefore considered to be **not significant**.

7.9.58 Best practice measures to mitigate odours from the airport are provided in the Outline Operational Air Quality Plan (**Appendix 7.5** of this ES **[TR020001/APP/5.02]**).

Sensitivity Analysis

7.9.59 There are certain known scenarios or risks that may occur that could influence the conclusions of the Core Planning Case assessment. These scenarios and the general approach to considering them in this assessment are described in **Section 5.4** of **Chapter 5** of this ES **[TR020001/APP/5.01]**.

7.9.60 **Table 7.10** provides the qualitative and quantitative assessments undertaken of any likely changes to the conclusions of the assessment reported in this chapter, in the event that that scenario or risk is realised.

Table 7.10: Qualitative Sensitivity Analysis

Sensitivity scenario	Potential impact and change	Likely effect
1.19 mppa Application	The increase in capacity from 18 mppa (currently assessed) to 19 mppa may potentially increase the concentrations of the future baseline scenarios as a result of increased emissions related to increased activity.	The likely effect attributable to the Proposed Development would be reduced as the difference between the DM future baseline and DS scenario as a result of Proposed Development would reduce.
2.Faster Growth	This sensitivity test scenario has been quantitatively assessed through modelling. The passenger demand grows faster than projected in the Core Planning	A quantitative assessment of the same assessment phases using the aircraft movements and surface access traffic data for Faster Growth has been

Sensitivity scenario	Potential impact and change	Likely effect
	Case. This would mean increases of aircraft movements and traffic earlier than is forecast in the Core Planning Case. Forecast aircraft movements and aircraft fleets have been used in the assessment. With regards to road traffic, volumes will change and forecast traffic data has been used in the assessment. The construction programme would remain the same, therefore the construction impacts would not change. In addition, this sensitivity test includes consideration of 23 mppa being reached by 2027 in assessment Phase 1.	undertaken and the results are provided in **Appendix 7.4** of this ES **[TR020001/APP/5.02]**. There were no changes to the significance of impacts or impact of compliance predicted for this sensitivity scenario across all assessment phases. The effect was predicted to be **not significant** and therefore there is no likely change to the Core Planning Case results. A qualitative review of the 23 mppa sensitivity test was carried out and the results are provided in **Appendix 7.4** of this ES **[TR020001/APP/5.02]**. There are no likely change to the significance of impacts or impact of compliance predicted for this sensitivity scenario across all assessment phases. The effect is considered to be **not significant** and therefore there is no likely change to the Core Planning Case results.
3.Slower Growth	The slower growth in forecast passengers would mean that increases of aircraft movements and traffic would occur later in the Slower Growth sensitivity. Further into the future, road vehicle fleets are forecast to be less polluting as predicted by DEFRA (Ref. 7.53). Therefore, there would be a reduced impact from the surface access traffic generated by the Proposed Development.	A quantitative assessment of the same assessment phases using the aircraft movements and surface access traffic data for Slower Growth has been undertaken. The results are provided in **Appendix 7.4** of this ES **[TR020001/APP/5.02]**. There were no changes to the significance of impacts or impact of compliance predicted for this sensitivity scenario across all assessment phases. The effect was predicted to be **not significant** and therefore there is no likely change to the Core Planning Case results.

Sensitivity scenario	Potential impact and change	Likely effect
4.Next generation aircraft	An alternative long term fleet mix has been prepared which takes into account the next generation of aircraft (rather than existing new generation, such as the Max and Neo), which would have better environmental performance. These aircraft, which use technology not yet widely available, are expected to be zero or lower emissions in flight and therefore the likely change would be a decrease in aircraft emissions in comparison to the Core Planning Case assessment.	It is likely there will be a reduced effect as a result of the Proposed Development as the changes to emissions are predicted to be reduced in comparison to the Core Planning Case assessment.
5.M1 sensitivity	The Core Planning Case assumes the M1 south of Junction 10 will be upgraded to Smart Motorway, or other method, to provide all lane running and address current and predicted congestion on this stretch of the M1 in the future baseline without the Proposed Development, as agreed with National Highways. This sensitivity test assumes that all lane running is not delivered and the M1 continues to operate as is. Surface access traffic modelling has been undertaken and a quantitative assessment has been undertaken using that traffic data.	A quantitative assessment of this scenario has been undertaken. The results are provided in **Appendix 7.4** of this ES **[TR020001/APP/5.02]**. There were no changes to the significance of impacts or impact of compliance predicted for this sensitivity scenario across all assessment phases. The effect was predicted to be **not significant** and therefore there is no likely change to the Core Planning Case results.
6 Changes to airspace	Air space is being modernised across the south east of England as a separate process outside of this Proposed Development. The assessment presented within the ES assumes that existing flight paths remain. However, a qualitative sensitivity test of potential changes to airspace has been undertaken.	Airspace changes are not expected to occur below 1,000 feet to the extent that it would change likely impact on local air quality, due to the effects of mixing and dispersion, as described by the Department for Transport guidance (Ref. 7.39).

Modelling Sensitivity Analysis

7.9.61 The following air quality specific modelling sensitivity testing has been undertaken:

a. using the DEFRA NOx to NO_2 conversion tool to compare results to the Clapp and Jenkin approach detailed in **Appendix 7.1** of this ES **[TR020001/APP/5.02]**. The Clapp and Jenkins approach (main assessment methodology) resulted in higher total concentrations of NO_2 and greater changes, on average; and

b. modelling with traffic data split into periods (AM peak, inter-peak, PM peak, off-peak periods) to understand how it effects results compared to using AADT traffic data representing a day. No changes to the significance of impacts or impact of compliance were predicted for this sensitivity scenario across all assessment phases. The effect was predicted to be **not significant** and therefore there is no likely change to the Core Planning Case results.

7.9.62 A detailed terrain sensitivity test is not possible for aircraft emissions as the ADMS model is not able to model aircraft jet sources with terrain included. This is not considered to be a significant issue as the majority of emissions occur during the LTO phase when the aircraft are in the air and terrain would have limited impact on the dispersion. Although complex terrain has not been included in the modelling, large scale terrain effects are captured by the meteorological data used. Terrain data was obtained from the Ordinance Survey (OS) and shown in **Figure 7.38 [TR020001/APP/5.03]**.

7.10 Additional mitigation

7.10.1 The Outline Operational Air Quality Plan provided as **Appendix 7.5** of this ES **[TR020001/APP/5.02]** describes the mitigation measures identified as a result of the assessment process, that are proposed in addition to those already considered to be in place as described in **Section 7.8** Embedded and good practice mitigation measures. These are proposed to reduce or mitigate the effects on air quality as a result of the construction and operation of the Proposed Development.

Design

7.10.2 There are no aspects that are in 'outline design' and require additional mitigation as part of detailed design, with regards to air quality.

Construction

7.10.3 Mitigation has been identified as required with respect to the construction dust effects. However, the measures are considered good practice and therefore no additional mitigation is required as no residual significant impacts are predicted.

7.10.4 However, further measures beyond those good practices required have been considered including options to reduce on-site emissions from equipment and diesel generators as they are becoming more readily available and affordable in the market. With planning it is possible to achieve substantial reductions in on-site emissions during the construction phase. Given the size of the works and duration it is recommended that targets for the reduction of emissions on-site are written into environmental procurement requirements and a monitoring regime established to assess the effectiveness and application of emission saving measures. This has been secured in the CoCP in **Appendix 4.2** of this ES **[TR020001/APP/5.02]**.

7.10.5 As contaminated materials may be excavated during construction of the Proposed Development, excavated materials could contain odorous materials. Measures have been provided for the lead contractors to implement to minimise the risk of odour generation. These are provided in the CoCP in **Appendix 4.2** of this ES **[TR020001/APP/5.02]**.

Operation

7.10.6 No significant impacts are predicted as a result of the Proposed Development, however, continued air quality monitoring around the airport will be conducted and an air quality emissions inventory will be maintained to help track implementation of the Outline Operational Air Quality Plan (**Appendix 7.5** of this ES **[TR020001/APP/5.02]**) measures and report on the above on an annual basis. This monitoring is described in the Outline Operational Air Quality Plan in **Appendix 7.5** of this ES **[TR020001/APP/5.02]**, which will be secured by a Requirement of the Development Consent Order. The Outline Operational Air Quality Plan is supplemented by measures set out in the **Green Controlled Growth** document submitted with the application for development consent

[TR020001/APP/7.08] which provides a mechanism for future review and implementation of future actions if required.

7.11 Residual effects

Construction

7.11.1 No additional mitigation has been proposed with respect to construction related air quality effects. As such the effects would be as reported in **Section 7.9**.

Operation

7.11.2 No additional mitigation has been proposed with respect to operational air quality effects. As such the effects would be as reported in **Section 7.9**.

7.12 In-combination climate change effects

7.12.1 This section provides an assessment of potential changes to the findings of the air quality assessment, taking into account the predicted future conditions as a result of climate change, known as In-combination Climate Change Impacts (ICCI).

7.12.2 This assessment has been undertaken using the methodology and climate change predictions described in **Chapter 9** of this ES **[TR020001/APP/5.01]**. The results are provided in **Table 7.11**.

Table 7.11: Air quality in-combination climate change impacts

Climate hazard	Likelihood of climate hazard occurring	Likely ICCIs identified	Description of ICCI considering embedded environmental measures/good practice	Likelihood of ICCI occurring	Consequence	Significance of ICCI effects
Increased number of hot days; increase of droughts.	Remote	Increased dust production during construction due to extended dry spells.	During the construction phase, extended dry spells may cause increased dust production. This consequence would be minimised as far as reasonably practicable, through the measures required by the CoCP (**Appendix 4.2** in of this ES **[TR020001/APP/5.02]**) (e.g. reduce dust emissions through the effective transportation and storage of materials), including the proposed monitoring regime.	Improbable	Very low	Negligible Not significant
Increased number of hot days.	Frequent	Sunnier and drier / drought conditions	It is unlikely that sunnier and drier/drought	Remote	Very low	Negligible Not significant

Climate hazard	Likelihood of climate hazard occurring	Likely ICCIs identified	Description of ICCI considering embedded environmental measures/good practice	Likelihood of ICCI occurring	Consequence	Significance of ICCI effects
		could change concentrations of certain air pollutants such as NOx, $PM_{2.5}$ PM_{10} and ozone (O_3).	conditions will exacerbate concentrations of NOx, $PM_{2.5}$ and PM_{10} because aircraft engines and ground transportation, such as cars, are expected to be cleaner in the future. This is because aircraft engines will comply with emission standards set by the Committee on Aviation Environmental Protection (CAEP) (Ref. 7.54) and there will be improvements in road vehicle technology and changes in fleet composition with higher proportion of low emission vehicles, as predicted by DEFRA.			

Climate hazard	Likelihood of climate hazard occurring	Likely ICCIs identified	Description of ICCI considering embedded environmental measures/good practice	Likelihood of ICCI occurring	Consequence	Significance of ICCI effects
			O_3 is likely to increase and consequently affect NO_2 concentrations. O_3 is a trans-boundary pollutant which is formed in the atmosphere from reactions involving other pollutants. It is not directly emitted from processes that can be regulated, therefore there are limited mitigation measures available to the Applicant in relation to O_3. The change in surface O_3 concentrations are likely to be small in comparison to the important precursor pollutants to O_3 formation (NOx, methane, and non-methane volatile organic compounds).			

Climate hazard	Likelihood of climate hazard occurring	Likely ICCIs identified	Description of ICCI considering embedded environmental measures/good practice	Likelihood of ICCI occurring	Consequence	Significance of ICCI effects
Increased number of hot days.	Frequent	Sunnier/hotter conditions could increase aircraft emissions due to the steeper climb angles taken.	It is unlikely that conditions will exacerbate emissions because aircraft engines are expected to be cleaner in the future.	Remote	Very low	Negligible Not significant
Changes to wind speed	Remote	Changes in wind speed and direction could influence local pollutant levels.	There is considerable uncertainty in projections for changes in wind speed and wind direction, and studies show statistically insignificant variation in wind speed. Monitoring measures are already in place. If there is increased channelling due to changes in wind direction this would increase annual average levels at some receptors and decrease them at	Improbable	Very low	Negligible Not significant

Climate hazard	Likelihood of climate hazard occurring	Likely ICCIs identified	Description of ICCI considering embedded environmental measures/good practice	Likelihood of ICCI occurring	Consequence	Significance of ICCI effects
			others. However, DEFRA predicts that background concentrations are likely to decrease.			

7.13 Monitoring

Construction monitoring

7.13.1 Monitoring for high risk sites would include the following measures as set out in the CoCP in **Appendix 4.2** of this ES **[TR020001/APP/5.02]**, which is secured by a Requirement of the Development Consent Order:

a. undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100m of site boundary, with cleaning to be provided if necessary;

b. carry out regular site inspections to monitor compliance with the dust management plan, record inspection results, and make an inspection log available to the local authority when asked;

c. increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions; and

d. agree real-time PM_{10} continuous monitoring locations with the Local Authority. Where possible commence baseline monitoring at least three months before work commences on site. Further guidance is provided by IAQM on monitoring during demolition, earthworks and construction (Ref. 7.36).

Operational monitoring

7.13.2 This monitoring is described in the Outline Operational Air Quality Plan in **Appendix 7.5** of this ES **[TR020001/APP/5.02]**, which will be secured by a Requirement of the Development Consent Order. Monitoring of air quality will continue during the operational phase to assess changes to air quality which may be as a result of the Proposed Development. Details of the air quality monitoring which will be carried out as part of the Green Controlled Growth work are detailed in Appendix D Air Quality Monitoring Plan of the **Green Controlled Growth Framework [TR020001/APP/7.08]**.

7.14 Assessment summary

7.14.1 **Table 7.12** provides a summary of the identified impacts, mitigation and likely effects of the Proposed Development on air quality. Additional mitigation and how it will be secured are described and its efficacy shown by the reported residual effect.

Table 7.12: Air quality preliminary assessment summary

Impact	Embedded/Good Practice Mitigation	Magnitude	Receptor Sensitivity	Description of effect and significance	Additional Mitigation	Residual Effect
Construction						
Construction dust	Construction dust management. Application of best practice mitigation measures secured through the CoCP, **Appendix 4.2 [TR020001/APP/5.02]**.	Medium to High	High	Not significant	n/a	n/a
Construction traffic (included in the operational results which are a combination of construction and operational traffic)	Use of AAR and A1081 to the M1 and not using roads near to receptors. Secured through construction traffic controls in CoCP and the Construction Traffic Management Plan an outline of which is provided as **Appendix 18.3** to this ES **[TR020001/APP/5.02]**.	Negligible	High	Not significant	n/a	n/a
Construction odour	Odour management. Application mitigation measures secured through the CoCP **Appendix 4.2 [TR020001/APP/5.02]**.	Negligible	High	Not significant	n/a	n/a

Impact	Embedded/Good Practice Mitigation	Magnitude	Receptor Sensitivity	Description of effect and significance	Additional Mitigation	Residual Effect
Operation						
Increased emissions to air from airport sources and from road traffic (combined construction and operation) at human receptors to human receptors	Outline Operational Air Quality Plan measures, **Appendix 7.5 [TR020001/APP/5.02].**	Negligible to slight adverse	High	Not significant	n/a	n/a
Operational odour	Odour management. Application mitigation measures secured through the Outline Operational Air Quality Plan, **Appendix 7.5 [TR020001/APP/5.02]**.	Slight adverse	High	Not significant	n/a	n/a

COMPETENT EXPERTS

Topic	Role	Company	Qualifications/competencies/experience of author
Air Quality	Author	Arup	MSc Health and the Environment 7 years of experience Member of the Institute of Air Quality Management Associate Member of Institute of Environmental Sciences Air Quality Specialist
Air Quality	Technical review	Arup	MSc Environmental Analysis and Assessment 15 years of experience Chartered Environmentalist Chartered Scientist Member of the Institute of Air Quality Management Member of Institute of Environmental Sciences Air Quality Specialist
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GLOSSARY AND ABBREVIATIONS

Term	Definition
AADT	Annual Average Daily Traffic
AAR	Airport Access Road
ADMS	Atmospheric Dispersion Modelling System
AEDT	Aviation Environmental Design Tool
ANPS	Airports National Policy Statement
APIS	Air Pollution Information System
APU	Auxiliary Power Units
AQAP	Air Quality Action Plan
AQMA	Air Quality Management Area
ARN	Affected Road Network
ASR	Annual Status Report (related to air quality)
AURN	Automatic Urban and Rural Network
AVDC	Aylesbury Vale District Council
AW	Ancient Woodland
BDC	Buckinghamshire District Council
CBC	Central Bedfordshire Council
CO	Carbon monoxide
CoCP	Code of Construction Practice
DEFRA	Department for Environment Food & Rural Affairs
DM	Do-Minimum
DMP	Dust management plan
DMRB	Design Manual for Roads and Bridges
DS	Do Something = an assessment scenario describing the conditions with the Proposed Development in place
DT	Diffusion tube
EFT	Emissions factor toolkit
EHO	Environmental Health Officer
EIA	Environmental Impact Assessment
EPUK	Environmental Protection UK
ES	Environmental Statement
FEGP	Fixed Electrical Ground Power
FOCA	Swiss Federal Office of Civil Aviation
FOI	Swedish Defence Research Agency
GIS	Geographic Information System
GPU	Ground Power Units
GSE	Ground Support Equipment
HDV	Heavy duty vehicle (goods vehicles and buses >3.5t gross vehicle weight)

Term	Definition
HGV	Heavy Goods Vehicle
IAQM	Institute of Air Quality Management
ICAO	International Civil Aviation Organisation
ICCI	In-combination Climate Change Impacts
LAQM	Local Air Quality Management
LBC	Luton Borough Council
LDV	Light duty vehicle (cars and small vans <3.5t gross vehicle weight)
Luton Rising	A trading name for London Luton Airport Limited, the owners of London Luton Airport
LLAOL	London Luton Airport Operations Limited, the current operators of London Luton Airport
LNR	Local Nature Reserve
LTO	Landing and Take-off
LTP	Local Transport Plans
LWS	Local Wildlife Site
MCATS	Modelling categories
mppa	Million passengers per annum
NAEI	National Atmospheric Emissions Inventory
NH_3	Ammonia
NHDC	North Hertfordshire District Council
NNR	National Nature Reserves
NO	Nitric oxide
NOx	Oxides of Nitrogen
NO_2	Nitrogen Dioxide
NRMM	non-road mobile machinery
O_3	Ozone
OS	Ordnance Survey
PEIR	Preliminary Environmental Information Report
PM_{10}	Particulate Matter 10 micrometers or smaller in diameter
$PM_{2.5}$	Particulate Matter 2.5 micrometers or smaller in diameter
PM_1	Particulate Matter 1 micrometers or smaller in diameter
pNO_2	Primary NO_2
ppb	parts per billion
PSDH	Project for Sustainable Development of Heathrow
SAC	Special Areas of Conservation
SADC	St Albans District Council
SDC	Stevenage District Council
SoS	Secretary of State
SO_2	Sulphur dioxide
SPA	Special Protection Areas

Term	Definition
SSSI	Site of Special Scientific Interest
TWG	Technical Working Group
UFP	Ultrafine particles
VOC	Volatile Organic Compounds
WebTAG	Web-based Transport Analysis Guidance
WHO	World Health Organization
ZOI	Zone of influence

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