

London Luton Airport Operations Limited

Luton Airport Expansion - 19 mppa

Environmental Impact Assessment

Volume 2: Environmental Statement Addendum



Report for

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Doc Ref. 41431RR20V3

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Document revisions

No.	Details	Date
1	Final Environmental Statement	January 2021

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1. Introduction

The 2014 Planning Permission

- 1.1.1 On 23 June 2014, London Luton Airport Operations Limited (hereafter referred to as 'the Applicant') was granted planning permission subject to conditions for the following development at London Luton Airport ('LLA'), Airport Way, Bedfordshire.

"Full planning application for dualling or airport way/airport approach road and associated junction improvements, extensions and alterations to the terminal buildings, erection of new departures/arrivals pier and walkway, erection of a pedestrian link building from the short –stay car park to the terminal, extensions and alterations to the mid-term and long-term car parks, construction of a new parallel taxiway, extensions to the existing taxiway parallel to the runway, extensions to existing aircraft parking aprons, improvements to ancillary infrastructure including access and drainage, and demolition of existing structures and enabling works. Outline planning application for the construction of a multi-storey car park and pedestrian link building (all matters reserved)" (ref: 12/01400/FUL) (hereafter referred to as the 'June 2014 Permission')

- 1.1.2 The planning application for the June 2014 Permission was submitted on 3 December 2012 (the 'December 2012 Application'). The December 2012 Application was accompanied by an Environmental Statement (ES) dated November 2012 (the 'November 2012 ES') prepared by Terence O'Rourke Ltd.

- 1.1.3 The November 2012 ES was prepared under the *Town and Country Planning (Environmental Impact Assessment) Regulations 2011* (the '2011 Regulations')¹ and assessed the likely significant effects of the proposed development pursuant to the December 2012 Application in relation to the following topics:

- Air quality and climate;
- Cultural heritage;
- Ecology and nature conservation;
- Community and economic;
- Ground conditions;
- Landscape and visual impact;
- Noise and vibration;
- Traffic and transport; and
- Water environment.

- 1.1.4 Additionally, a Health Impact Assessment was included as an appendix in the November 2012 ES.

- 1.1.5 Following the grant of the June 2014 Permission, an application was submitted on 25 June 2015 for variation of condition 11(i) to vary an element of the noise controls applied to the June 2014 Permission (the 'Variation Application'). The Variation Application was accompanied by an ES Addendum dated July 2015 which described the proposed changes in full and presented an assessment of any new or different likely significant effects on the environment as a result of the

¹ Town and Country Planning (Environmental Impact Assessment) Regulations 2011 [online]. Available at: <https://www.legislation.gov.uk/uksi/2011/1824/contents/made> [Accessed 20 December 2020].

Variation Application (the 'July 2015 Addendum'). The July 2015 Addendum did not affect the assessment or conclusions of a majority of the November 2012 ES because it only related to the variation of operational noise and violation limits. Therefore, the July 2015 Addendum only assessed noise and vibration environmental effects.

- 1.1.6 Planning permission was granted for the Variation Application on 13 October 2017 (reference: 15/00950/VARCON) subject to conditions (the 'Variation Permission').
- 1.1.7 The Variation Permission repeated the description of development and conditions imposed on the June 2014 Permission (save where certain conditions had been discharged and save also for the amendment to condition 11). The Variation Permission therefore represents the existing consented position in relation to the development and is referred to in this ES Addendum as the '2014 Planning Permission'.
- 1.1.8 The ES in relation to the development consented by the 2014 Planning Permission therefore comprises the November 2012 ES and the July 2015 Addendum. They are referred to in this document collectively as the '2012 ES'.

1.2 The proposed amendments

- 1.2.1 The 2014 Planning Permission contains a condition (Condition 8) which limits the commercial passenger throughput of the airport to 18 million passengers per annum (mppa -this is the number of passengers that fly in or out of the airport in any twelve month period). This is referred to throughout this ES as the '18 mppa cap'.
- 1.2.2 The 18 mppa cap imposed by the 2014 Planning Permission reflected the forecasts at that time, which anticipated that LLA would see a steady rise to around 18 mppa by about 2027. According to the London Luton Airport Vision for Sustainable Growth 2020-2050², the latest forecasts for LLA anticipated that the 18 mppa capacity was expected to be fully utilised by 2020. However, LLA reached the 18 mppa cap during 2019³, almost a decade earlier than originally forecast in the 2012 ES. The Applicant is therefore seeking to increase the 18 mppa cap to a 19 mppa cap.
- 1.2.3 The Applicant is also seeking to vary the 2014 Planning Permission such that it provides for a less restrictive day and night contour than is currently set out. This is proposed to be achieved through adjustments to the area enclosed by both the daytime and night-time contours.
- 1.2.4 These amendments are proposed to be effected through a variation of 5 conditions attached to the 2014 Planning Permission. Full details of these amendments are set out in **Chapter 3: Description of the Proposed Scheme**. These amendments are hereafter referred to as the 'Amendments'.
- 1.2.5 The Amendments can be accommodated without any new operational development. The additional passengers pursuant to the 19 mppa cap would be accommodated through a small increase in the number of air transport movements ('ATMs') and the use of larger aircraft (See **Section 3.3**, **Table 3.3**, and **Table 3.4**).

² London Luton Airport Ltd (n.d.). London Luton Airport Vision for Sustainable Growth 2020 – 2050, [online]. Available at: <https://www.llal.org.uk/Documents/vision2020-2050.pdf> [Accessed 11 May 2020].

³ London Luton Airport Operations Limited (LLAOL), (2019). Carbon footprint report. [online]. Available at: <https://www.london-luton.co.uk/LondonLuton/files/50/50af686c-ffae-49fd-981d-180f588dd5d6.pdf> [Accessed 14 September 2020].

Summary of proposed amendments

- 1.2.6 The planning application for the Amendments seeks to increase the annual passenger cap from 18 mppa to 19 mppa through the variation of the following five conditions attached to Variation Permission:
- 1.2.7 **Condition 8: Passenger throughput cap** - the modification of Condition 8 would allow passenger throughput at LLA to rise to 19 mppa without necessitating any additional on-site or off-site development.
- 1.2.8 **Condition 10: Noise contours** - variation to the wording of Condition 10 would provide a less restrictive day and night noise contour. This adjustment is required to reflect the fact that in recent years there has been a slower than anticipated introduction by airlines of the next generation of quieter aircraft. The modernisation of fleets, which is largely outside the control of the airport, has not kept pace with the unexpectedly steep rise in passenger demand.
- 1.2.9 **Condition 22: Car parking management** - no changes to the airport's existing car parking facilities are proposed to accommodate the additional passengers. However, an updated Car Parking Management Plan (CPMP) is being provided to support the 19 mppa proposal and therefore a variation to Condition 22 is required.
- 1.2.10 **Condition 24: Travel Plan** – an updated Travel Plan to accommodate 19 mppa is being provided to support the 19 mppa proposal and therefore a variation to Condition 24 is required.
- 1.2.11 **Condition 28: Approved plans and documents** - updated submissions across a suite of technical evidence-based assessments necessitates the variation of Condition 28 which sets out the approved documentation in support of planning permission.

1.3 Scope of this Environmental Statement

- 1.3.1 This ES Addendum has been prepared to consider whether the Amendments are likely to alter the conclusions of the 2012 ES and to identify whether there are any additional or new likely significant environmental effects arising from the Amendments to the development consented by the 2014 Planning Permission. This ES has been prepared in accordance with the *Town and Country Planning (Environmental Impact Assessment) Regulations 2017* (the '2017 Regulations')⁴ taking into account new requirements for assessment of significant effects in relation to the Amendments.
- 1.3.2 The 2012 ES, supplemented by this ES Addendum, read together, set out the assessment of the likely significant environmental effects of the development consented by the 2014 Planning Permission including the Amendments (the 'Proposed Scheme'). Where relevant, new matters required to be considered by the 2017 Regulations have been assessed in relation to the Amendments.
- 1.3.3 A number of the topics considered in the 2012 ES do not require further consideration since the Amendments will not materially affect the previously identified effects presented in the 2012 ES and will not introduce any additional significant environmental effects. The topics for which no material changes are likely to occur to the previously identified effects and no further technical assessment is required are set out below under the heading 'Screening'. New topics required to be considered by the 2017 Regulations have been considered in relation to the Amendments. Further information is set out in **Section 4.4**.
- 1.3.4 This ES Addendum draws upon the comments provided by LBC within the Screening Opinion (**Appendix 1B** in **Volume 3: Figures and Appendices**), scoping meeting (**Appendix 1C** in **Volume**

⁴ Town and Country Planning (Environmental Impact Assessment) Regulations 2017 [online]. Available at: http://www.legislation.gov.uk/ukxi/2017/571/pdfs/ukxi_20170571_en.pdf [Accessed 25 August 2020].

3: Figures and Appendices), and subsequent assessment work. For the remaining topics, the Amendments may materially change the previously identified significant effects or introduce new significant effects and therefore a revised assessment or further assessment has been undertaken and the results are presented in this ES Addendum. There are also areas whereby the updated 2017 Regulations require assessment whereas the 2011 Regulations did not.

- 1.3.5 The topics which may be affected by the Amendments of the Proposed Scheme or for which assessment is now required comprise:
- Air quality;
 - Climate change;
 - Noise;
 - Health; and
 - Transport.
- 1.3.6 The results of the additional assessment for these topics are presented in **Chapters 6 – 10** of this ES Addendum (hereafter referred to as the 'ES') and supported by technical reports which are provided as appendices.

Screening

- 1.3.7 The first stage of the EIA process is to confirm whether a proposed scheme triggers the need for an EIA by undertaking a screening assessment. This involves screening against the descriptions of development given in Schedule I⁵ and II⁶ of the 2017 EIA Regulations. For proposed schemes listed under Schedule I of the 2017 EIA Regulations an EIA is mandatory. If a proposed scheme is listed in Schedule II an EIA is required where it is likely to have significant effects on the environment, by virtue of factors such as its nature, size, or location.
- 1.3.8 A formal Screening Opinion (**Appendix 1A in Volume 3: Figures and Appendices**) was sought from LBC for the variations associated with the Proposed Scheme. Consideration against the criteria set out in Schedule II of the 2017 EIA Regulations is shown in **Table 1.1**. This indicates that the Proposed Scheme meets threshold (i) of paragraph 13(b) and has the potential to have significant effects on the environment, due to the characteristics, location, and potential impact. The Proposed Scheme was screened against the criteria set out in Schedule III. LBC in its Screening Opinion (**Appendix 1B in Volume 3: Figures and Appendices**) considered that the resultant noise impact of the Proposed Scheme is likely to have a significant environmental effect, which has the potential to harm human health. Therefore, the Proposed Scheme was deemed EIA development therefore requiring the environmental impacts of the proposal to be properly assessed and presented in an ES.

Table 1.1 Schedule II criteria of the 2017 EIA Regulations for which the Proposed Scheme was considered against

Column 1: Description of development	Column 2: Applicable thresholds and criteria
13. Changes and extensions	
<i>"(a) Any change to or extension of development of a description listed in Schedule 1 (other than a change or extension falling</i>	<i>"Either-</i>

⁵ Schedule I - descriptions of development for the purposes of the definition of "schedule I development"

⁶ Schedule II - descriptions of development and applicable thresholds and criteria for the purposes of the definition of "schedule II development"

Column 1: Description of development	Column 2: Applicable thresholds and criteria
<i>within paragraph 24 of that Schedule) where that development is already authorised, executed or in the process of being executed."</i>	<p>(i) The development as changes or extended may have significant adverse effects on the environment; or</p> <p>(ii) in relation to development of a description mentioned in a paragraph in Schedule 1 the thresholds and criteria in column 2 of the paragraph of the table applied to the change or extension are met or exceeded."</p>
<i>"(b) Any change to or extension of development of a description listed in paragraphs 1 to 12 of column 1 of this table, where that development is already authorised, executed or in the process of being executed."</i>	<p>"Either-</p> <p>(i) The development as changed or extended may have significant adverse effects on the environment; or</p> <p>(ii) in relation to a development of a description mentioned in column 1 of this table, the thresholds and criteria in the corresponding part of column 2 of this table applied to the change or extension are met or exceeded."</p>

Scoping

- 1.3.9 A meeting between the Applicant's team and LBC was held on September 7 2020 to discuss and agree the potential likely significant environmental effects associated with the Proposed Scheme. In this meeting the scope of the EIA was agreed with LBC (**Appendix 1C in Volume 3: Figures and Appendices**).

Preparation of the Environmental Statement

- 1.3.10 The third stage of the EIA process involves the preparation of an ES. The ES provides information relating to the likely significant environmental effects of the Proposed Scheme; it is intended for use by LBC and other stakeholders, to inform the process of determining the application for planning permission.

1.4 Approach of this Environmental Statement

- 1.4.1 The overall approach that has been taken to defining significance, as well as further information about the approach to preparing the ES, are outlined in **Chapter 4: Approach to preparing the Environmental Assessment** of this document.
- 1.4.2 As set out in Schedule 4 of the 2017 EIA Regulations, this ES contains the following information:
- The location of the development (**Figure 1.1 in Volume 3: Figures and Appendices**);
 - The characteristics and land-use requirements of the Proposed Development, considering construction and operation (including requisite demolition works where relevant) (see **Chapter 3: Description of the Proposed Scheme**);
 - Operational processes such as energy, materials and natural resources used (see **Chapter 3: Description of the Proposed Scheme** and **Chapters 6 – 10**);
 - Any residues and emissions (such as water, air, soil and subsoil pollution, noise, vibration, light, heat, radiation and quantities and types of waste produced during the construction and operation phases) (see **Chapter 6 – 10**);
 - The reasonable alternatives that the developer has studied with a comparison of their environmental effects (see **Chapter 2: Proposed Scheme needs and alternatives**);

- *The baseline environment and its evolution in the absence of the development* (see **Chapter 6 – 10**);
- *A description of the likely significant effects of the Proposed Development on environmental factors - population, human health, biodiversity, land, soil, water, air, climate, material assets, cultural heritage and landscape* (see **Chapter 6 – 10** and summarised in **Chapter 11: Summary**);
- *A description of the methods used in the assessment to determine whether significant effects are likely to occur* (see **Chapter 6 – 10**);
- *A description of measures and monitoring that have been identified to address likely significant effects* (see **Chapter 6 – 10**);
- *A description of the development's vulnerability to major accidents and disasters* (scoped out of the assessment, see **Chapter 4** for further details);
- *A non-technical summary* (**Volume 1, Non-Technical Summary**); and
- *A list of references* (see footnotes).

1.4.3 Regulation 4 and Schedule 4 of the 2017 EIA Regulations require that the environmental topics listed in column 1 of **Table 1.2** need to be considered when preparing an ES. Column 2 then lists where these topics are included in this ES, with reference to the relevant chapter numbers.

1.4.4 Further information on the reasons why certain topics were scoped out of the assessment is provided in **Chapter 4: Approach to preparing the Environmental Statement**.

Table 1.2 Environmental topics to be addressed in the ES and chapter references

Topics ⁷ that need to be assessed under the EIA Regulations	Chapter titles in this ES
Population	Human health [Chapter 9]
Human health	Air quality [Chapter 6], Human health [Chapter 9], and Noise [Chapter 8]
Biodiversity	Scoped out of the assessment [Chapter 4]
Land	Scoped out of the assessment [Chapter 4]
Soil	Scoped out of the assessment [Chapter 4]
Water	Scoped out of the assessment [see Chapter 4 , and the Drainage and water supply infrastructure appraisal document reference: 41431JG22V2]
Air	Air quality [Chapter 6], and Transport [Chapter 10]
Climate	Climate [Chapter 7]
Material assets	Climate [Chapter 7], Transport [Chapter 10] Waste scoped out of the assessment - see document 41431BNV2 for the updated Site Waste Management Plan.
Cultural heritage	Scoped out of the assessment [Chapter 4]

⁷ In this ES, the word 'topic' is used when referring to the environment that could be affected by the proposed development. Other words with the same general meaning are used in the 2017 EIA Regulations, notably 'factor' and 'aspect', but these are not used in the same context within this ES.

Topics ⁷ that need to be assessed under the EIA Regulations	Chapter titles in this ES
Landscape	Scoped out of the assessment [Chapter 4]
Waste and Resource Use	Scoped out of the assessment - see document 41431BNV2 for the updated Site Waste Management Plan
Major Accidents and Disasters	Scoped out of the assessment [Chapter 4]
Interaction between the above factors	These are discussed within each Chapter where relevant.
Cumulation with other projects	Cumulative effects [Chapter 4]

1.5 The Applicant and the project team

- 1.5.1 This ES has been prepared on behalf of the Applicant (LLAOL) by Wood Group UK Limited (hereafter referred to as Wood), with the support of Public Health by Design.
- 1.5.2 Wood is registered with the Institute of Environmental Management and Assessment (IEMA) EIA Quality Mark scheme. The scheme allows organisations that lead the co-ordination of EIAs in the UK to make a commitment to excellence in their EIA activities and have this commitment independently reviewed.
- 1.5.3 A statement outlining the relevant experience and qualifications of the competent experts who have prepared this ES is provided in **Appendix 1D** in **Volume 3: Figures and Appendices**. A statement from the Applicant that confirms that it considers the experts to be competent is included in **Appendix 1E** in **Volume 3: Figures and Appendices**.

1.6 Structure of this Environmental Statement

- 1.6.1 The ES comprises 3 volumes:
- **Volume 1** is a Non-Technical Summary (NTS), which is available as a standalone document.
 - **Volume 2** (i.e. this volume) is sub-divided into the following chapters.
 - ▶ **Chapter 2** explains the need for the Proposed Scheme, outlines the main alternatives considered for meeting this need and indicates the main reasons for the preferred choice.
 - ▶ **Chapter 3** provides a detailed description of the Proposed Scheme and associated changes to the airport.
 - ▶ **Chapter 4** details the approach that has been adopted in preparing the ES.
 - ▶ **Chapter 5** provides an overview of the legislation and policies that are relevant to the ES.
 - ▶ **Chapters 6 to 10** set out the technical assessments for the environmental topics that are scoped in the ES.
 - ▶ **Chapter 11** provides a summary of all the environmental topics considered within this ES.
 - **Volume 3** contains the appendices and figures referred to in the ES.
- 1.6.2 A glossary of technical terms is provided in **Appendix 1F** in **Volume 3: Figures and Appendices** and list of abbreviations is provided in **Appendix 1G** in **Volume 3: Figures and Appendices**.

1.7 Other documents

1.7.1 The planning application for the Proposed Scheme is informed by the ES, but is also informed by other documents, the contents of at least some of which are of direct relevance to the findings of the ES. The latter reports, which are listed below, are therefore included within the planning application submission:

- Consultation summary report (see document reference **41431EP12V2**);
- Drainage and water supply infrastructure appraisal (see document reference **41431JG22V2**);
- Planning Statement (see document reference **41431EP12V103**);
- Transport assessment (see document reference **41431MP17V1**);
- Site Waste Management Plan (see document reference **41431BNV2**).

1.8 Access to the Environmental Statement

1.8.1 The ES is available in electronic form via LBC's online planning portal and Luton Airport's Consultation website (<http://www.luton19mppa.info/>). Hard copies will not be made available due to it not being reasonably practicable to do so connected to the effects of the COVID-19 pandemic, this follows the May 2020 and December 2020 Temporary Amendments to the 2017 EIA Regulations⁸.

⁸ Town and Country Planning (Development Management Procedure, Listed Buildings and Environmental Impact Assessment) (England) (Coronavirus) (Amendment) Regulations 2020 [online]. Available at: <https://www.legislation.gov.uk/uksi/2020/505/made> [Accessed 08 January 2021].

2. Proposed Scheme need and alternatives

2.1 Need for the proposed variations

Variation to Condition 8

- 2.1.1 In 2012, the Applicant submitted the application for the 2014 Planning Permission to increase the capacity of LLA to 18 mppa. This was accompanied by an ES that, amongst other topics, assessed the anticipated noise impact of the increase in passenger numbers. As part of that process, the airport operators forecast included an anticipated trajectory of passenger numbers, year on year. The forecast predicted that LLA would reach 17.3 mppa from 2026 and grow to 17.8 mppa from 2028 and remain at this level until 2030. Using data regarding the forecast of passenger numbers, a forecast was made of flight numbers, and the anticipated make-up of those flights in regarding their make and model, which allowed the calculation of their likely noise generation.
- 2.1.2 Since 2012, LLA has experienced unprecedented levels of growth in passenger numbers which are considerably above those predicted in the 2014 Planning Permission and was the 5th busiest airport in the UK by passenger numbers in 2019⁹. Passenger levels at LLA have increased by more than 1 mppa each year on average over the last three years from 2017 – 2019, reaching the 18 mppa cap in 2019¹⁰, almost a decade earlier than forecast in the 2014 Planning Permission.
- 2.1.3 Currently, the COVID-19 pandemic has brought upon many uncertainties with regards to passenger forecasts. However, it is anticipated that LLA will recover swiftly from the temporary COVID-19 implications from travel restrictions (see **Section 2.2** and the **Planning Statement** (document reference **41431EP12V103**), and LLA has been the second busiest airport in the UK (by passenger numbers) during these travel restrictions (in May and June 2020), after Heathrow.
- 2.1.4 When granting the 2014 Planning Permission LBC determined that an 18 million cap on annual passenger numbers should be put in place. Although, it also accepted that passenger capacity is not a rigid number as it can only be based on a forecast using contemporary data. The decision notice acknowledged (within the reasons for granting planning permission) that airport capacity assessments use a range rather than a single figure in order to reflect uncertainties, for example whether patterns of traffic continue at the same level or return to peak historic ratios. It was accepted that the passenger capacity range at LLA as a result of the 2014 Planning Permission would be between 18 and 20 mppa.
- 2.1.5 The forecasts used in the 2014 Planning Permission estimated that an 18 mppa cap would accommodate steady growth in passenger numbers up until 2028. However, as growth in passenger numbers has occurred at a much faster rate than was originally forecasted the Applicant is seeking to increase the passenger cap to 19 mppa to allow LLA to continue to grow effectively and sustainably in the short-term.
- 2.1.6 The Applicant has carried out further capacity analysis through the airport Master Plan assessment including traffic forecast and capacity analysis¹¹. This analysis confirmed that the existing landside

⁹ The CAA, UK Airports – Annual Statements of Movements, Passengers, and Cargo [online]. Available at: <https://www.caa.co.uk/Data-and-analysis/UK-aviation-market/Airports/Datasets/UK-Airport-data/Airport-data-2019/> [Checked November 2020].

¹⁰ LLA, Annual Monitoring Reports [online]. Available at: <https://www.london-luton.co.uk/corporate/community/noise/annual-monitoring-reports> [Checked November 2020].

¹¹ London Luton Airport (2020). London Luton Airport Master Plan 19 MPPA draft report. Available [online] at: http://www.luton19mppa.info/Downloads/Draft_Masterplan.pdf [Accessed November 2020].

and airside facilities at LLA have sufficient capacity to accommodate the additional 1 mppa to reach 19 mppa, without the need for additional infrastructure.

- 2.1.7 Despite the impacts of COVID-19, which has seen passenger numbers drop from 18 million in 2019 to 5 million in 2020, these changes are being sought now so LLA is in a good position for the future and can continue to create benefits for the passengers, the supply chain, and the local economy. While it is unlikely passenger numbers will return for several years, LLA must prepare for the future and this application is focused on making sure LLA has the best possible footing to bounce back and help the local and national economy recover.

Variation to Condition 10

- 2.1.8 The variation to Condition 10 is required in order to take account of the fact that the introduction of new quieter aircraft has not kept pace with the unprecedented growth in passenger demand. The passenger level reached the 18 mppa cap in 2019¹⁰.
- 2.1.9 New quieter aircraft started to come into operation from 2017. However, the new quieter aircraft have not entered airlines' fleets at the rate that was anticipated or required to meet the noise contour assessed as part of the 2014 Planning Permission. As a consequence, the delivery of re-engined aircraft has not aligned to the unexpected passenger growth. The existing aircraft mix being utilised at LLA is older and generates more noise than the aircraft mix associated with the 16.6 mppa that was anticipated in the 2014 Planning Permission.
- 2.1.10 In addition to this, there has been a delay in the manufacture of Airbus Neo aircraft due to production issues at engine supplier Pratt and Whitney. There has also been the grounding of Boeing 737Max aircraft due to safety concerns. Both these issues mean that there are lower numbers of new generation aircraft at LLA compared to the original assumptions made as part of the 2014 Planning Permission's 2028 forecast for 18 mppa.
- 2.1.11 Airlines operating at LLA are upgrading their aircraft fleet between 2019 and 2026. However, the Applicant has no control over either the rate of manufacture or the introduction of those new aircraft. Although there are incentives to introduce the next generation aircraft as part of the airlines' fleets that operate out of the airport, scheduling and other airline considerations dictate which aircraft are allocated from each fleet for particular flights at LLA. Furthermore, the Applicant has limited means to control the rate and timing of the technological and commercial transition onto the next generation aircraft. Nevertheless, airlines at LLA have placed orders for these modern aircraft and continue to do so, and it is anticipated that these aircraft would be delivered between 2021 and 2028.
- 2.1.12 Data from the noise monitoring carried out by LLA (and published as part of LLA's annual monitoring reports) revealed that the contours as set in Condition 10 have been exceeded since 2017, albeit only slightly. The Applicant has looked extensively at their operations to ascertain why the contour was breached and what measures can reasonably be taken to guard against further breaches (see **Section 3.4**).
- 2.1.13 A series of severe weather events, combined with European Air Traffic Control disruption, resulted in flights that were scheduled to arrive in the daytime period instead arrived in the night-time period. The additional unplanned night-time flights contributed to Condition 10 being exceeded (circa 500 movements in the night period that were scheduled for the day period), and there is no mechanism to permit the exclusion of these movements from the assessment as there is with the movement and QC limits.
- 2.1.14 Following the exceedance of the night-time contour limit in 2017 the airport put in place a suite of operational restrictions to curb the number of movements during the night-time period to safeguard against a further exceedance of the limit. However, circumstances outside of the

Applicant's control such as continued disruption of European air traffic control such as industrial actions and weather events have meant that the contour was breached again in the following years.

- 2.1.15 Due to increased passenger numbers, slow introduction of new generation aircraft, and severe weather events, the Applicant is in a situation whereby the airport cannot operate to its full permitted 18 mppa capacity nor can it sustainably grow to 19 mppa whilst being confident that the restrictions of Condition 10 can be met. Therefore, a variation to Condition 10 has been proposed.

2.2 Implications of COVID-19

- 2.2.1 COVID-19 has had a devastating effect across the globe, with the transportation industry being one of the worst affected sectors. This has affected the operation of LLA considerably throughout 2020. However, LLA expects the impact of COVID-19 to be temporary with the operation of the airport returning to 2019 levels as described below.

Impact on passenger growth

- 2.2.1 Due to the temporary COVID-19 implications on travel restrictions, the Applicant is forecasting to serve far fewer passengers in 2020 than originally anticipated. This ranges from 5.8 mppa to 7.5 mppa.
- 2.2.2 It is anticipated that LLA would recover relatively swiftly from the temporary COVID-19 implications, having been the second busiest airport in the UK by passenger numbers during the travel restrictions (e.g. May and June 2020) after Heathrow. LLAOL expects passenger volumes to recover to 18 mppa by 2023 and could grow beyond 18 mppa in 2024. Therefore, the proposed variation to Condition 8 is being sought.
- 2.2.3 LLA's passenger recovery forecast is based on industry-wide research and forecast by Airports Council International (ACI). ACI are an industry body representing airports throughout the world, including LLA. ACI carried out a survey on the likely recovery of passenger demand to / from and within Europe in 2020 and 2021. The Applicant has further extrapolated those recovery rates beyond December 2021 to the end of 2024.
- 2.2.4 As part of the survey, ACI also asked the industry experts to answer specific questions related to the recovery. Considering LLA's heavy reliance on Low Cost Carriers (LCCs), the answers from the industry experts support the view that LLA would recover at a faster rate than other major London airports such as Heathrow or Gatwick.
- 2.2.5 The Applicant has applied the ACI research and industry consensus on passenger recovery to LLA passenger levels leading up to 2024 to the current 18 mppa cap. In the 'high' recovery scenario, it is reasonable to expect passenger volumes at LLA to return to 18 mppa in 2022. In the 'medium' recovery scenario, the passenger volumes at LLA are expected to return to 18 mppa in 2023 with the 'low' recovery scenario seeing the passenger volumes at LLA to recover to 18 mppa early 2024. However, it is noteworthy that only 12% of the ACI contributors believe the 'low' recovery scenario is a likely scenario for LLA. Furthermore, the ACI forecast reflects Europe as a whole and LLA's location as part of the London Aviation System and its preponderance of LCCs would suggest that the passenger recovery at LLA should be faster than the average of all European airports reflected in the ACI aggregated consensus.
- 2.2.6 Based on the ACI's industry insight, it is reasonable to believe that LLA will recover back to 18 mppa in line with the 'medium' scenario. This means that LLA could realistically be back at 18 mppa in 2023 and be growing beyond 18 mppa in 2024. As a result, the airport is likely to increase to 19 mppa in 2024. Additionally, given the current significant uncertainties in the market, it was determined to continue to progress with the Proposed Scheme as it would be the best approach to

LLA's recovery, therefore assuming that the airport will continue with the forecasted growth. Therefore, the 2024 passenger forecast remains a reasonable view of future operations and has been assumed to be a representation of the realistic worst-case scenario for growth at the airport. As such, the future scenarios analysed in this ES have used a 19 mppa scenario in 2024 and a 19 mppa scenario in 2028.

Impact on noise contours

- 2.2.1 It is noteworthy that whilst the passenger forecasts are reduced due to the temporary COVID-19 implications, the Applicant is still forecasting the summer aircraft movements (i.e. the movements on which the noise contours are based) to remain as originally forecasted. This is principally due to the fact that the European Commission is expected to retain the airport slot requirements, which oblige airlines to use their allocated take-off and landing slots in order to keep them the following year.
- 2.2.2 In March 2020, the European Commission announced that the airport slot requirements would be temporarily suspended until October 2020. This means that airlines retain slots secured in 2019 (i.e. when LLA operated at 18 mppa) to operate in 2021 regardless of whether they used the slots in 2020.
- 2.2.3 The Applicant cannot directly predict airlines behaviours in the future but the fundamental pressure on the London Aviation System remains (see **Section 3.4**), and slots at LLA have become increasingly valuable to the point where they are now traded for significant consideration. LLA is the third airport in the country to witness slot trades after Heathrow and Gatwick. It can therefore be expected that airlines will seek to retain those slots at LLA that are deemed to hold value.
- 2.2.4 Unless the European Commission continues the temporary relaxation on slot rules from summer 2021 into summer 2022, it is reasonable to assume that the slots seen in 2019 will recur in 2021 and onwards. If the airlines did not use their slots in 2021, then they would lose their slots for 2022 at a time when passenger demand is expected to return and approach the pre-pandemic levels. Airlines at LLA are likely to want to avoid this situation, and to continue using their slots in 2021. This means that airlines may fly their aircraft with reduced passenger loads, but the overall summer aircraft movements at LLA in 2021 and onwards would remain as originally forecasted by the Applicant. As such, a variation to Condition 10 is being sought.

2.3 Consideration of alternatives

Introduction

- 2.3.1 The 2017 EIA Regulations make two references to the consideration of alternatives, as follows.
- In paragraph 18(3)(d) of Part 5 it states that an ES should include "*a description of the reasonable alternatives studied by the developer, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the development on the environment.*"
 - Paragraph 2 of Schedule 4 states that an ES should include "*A description of the reasonable alternatives (for example in terms of development design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects.*"
- 2.3.2 As stated above, only where reasonable alternatives have been studied, do they need to be assessed.

- 2.3.3 The only potential alternative to the Proposed Scheme that was considered by the Applicant was to continue to operate at the 18 mppa cap. This is termed the 'do-nothing' (or 'without development') scenario. However, to progress with this alternative would not have delivered the anticipated economic growth. This is because restrictions would have to be placed on airlines to be confident that compliance with conditions attached to the 2014 Planning Permission was achievable. Furthermore, without restrictions on airlines there would be a risk of repeated breaches of Condition 10. As such, the 'doing nothing' was not considered to be a reasonable alternative.
- 2.3.4 Notwithstanding, the assessments presented throughout this ES use the 18 mppa 'do nothing' scenario as the current and future baseline and present the comparative environmental effects of these scenarios against those assessed for the Proposed Scheme.
- 2.3.5 As described in 2.2.3, there are no *reasonable* alternatives to the Proposed Scheme studied by the Applicant. This ES fulfils the requirements relating to alternatives under the 2017 Regulations.

3. Description of the Proposed Scheme

3.1 Introduction

3.1.1 In writing the scheme description, consideration has been given to the requirements of Schedule 4 of the 2017 EIA Regulations in which paragraph 1 states that the description should include:

- a) *"a description of the location of the development;*
- b) *a description of the physical characteristics of the whole development, including, where relevant, requisite demolition works, and the land-use requirements during the construction and operational phases;*
- c) *a description of the main characteristics of the development (in particular any production process), for instance, energy demand and energy used, nature and quantity of the materials and natural resources (including water, land, soil and biodiversity) used; and*
- d) *an estimate, by type and quantity, of expected residues and emissions (such as water, air, soil and subsoil pollution, noise, vibration, light, heat, radiation and quantities and types of waste produced during the construction and operation phases."*¹²

3.2 Scheme description

Site location and the surrounding area

- 3.2.1 LLA is located approximately 45 km north of London and the redline boundary is wholly within the local authority administrative area of LBC. Outside of the redline boundary, LLA owns land in Central Bedfordshire and North Hertfordshire. As shown in **Figure 1.1** in **Volume 3: Figures and Appendices**, it is situated to the south-east of Luton, directly adjacent to the A1081 to the west and Percival Way to the north. To the south and east, the airport is bound by agricultural land. The southern boundary of LLA closely follows the boundary between Luton and the district of Central Bedfordshire, while the easterly boundary follows the county boundaries between the counties of Hertfordshire and Bedfordshire.
- 3.2.2 LLA itself is approximately 245 ha and is predominantly level on a raised chalk plateau at the northern end of the Chiltern Hills, an Area of Outstanding Natural Beauty (AONB), and its highest point is approximately halfway along the runway. At the runway edges, the local topography steeply drops with a gradient of 1:12.5 beyond the western extent, and approximately 1:17 at the eastern extent of the Site. The general topography of the area to the south and east of Luton consists of a series of generally parallel ridges and valleys that run from north-west to south-east.
- 3.2.3 Further afield, the landscape is characterised by arable farmland and moderately sized villages or smaller clusters of residential properties. The arable farmland also contains pockets of priority habitat, namely deciduous woodland, ancient, replanted woodland, and semi-natural woodland located to the south and east of LLA. There are several listed buildings and two registered parks and gardens within 2 km of the airport. There is one scheduled monument, Someries Castle, located 0.75 km to the south-west of LLA. The nearest ecological designated site is Gallery Warden

¹² The Town and Country Planning (Environmental Impact Assessment) Regulations 2017, Schedule 4, Paragraph 1 [online]. Available at: <http://www.legislation.gov.uk/ukxi/2017/571/contents/made> [Checked March 2019].

Hills Site of Special Scientific Interest (SSSI), located 5 km north of LLA (as presented in **Figure 3.1** in **Volume 3: Figures and Appendices**).

Site history

- 3.2.4 The airport opened as Luton Municipal Airport in 1938 by the Borough of Luton, following a period of use by the Royal Air Force (RAF) during World War II. During World War II, the airport was home to 264 Fighter Squadron, as well as being a manufacturing base for both military and civil aircraft.
- 3.2.5 By 1952, civil use of the airport resumed, and in 1969 nearly a fifth of all flights from the UK departed from Luton. Despite financial difficulties during the 1970s, resulting from the liquidation of major tour operators, in 1985 a new international terminal building was opened. This was followed by the airport becoming a limited company in 1987, with LBC as sole shareholder. The airport was then re-named LLA in 1990 to mark its position as part of the London airport network.
- 3.2.6 Business continued to increase as new airlines were introduced and by 1998 passenger numbers had risen to 4.4 million per annum. Luton was the UK's fastest growing airport. In August 1998 the operation, management and development of the airport was formerly transferred from LBC to the Applicant, following the signing of a public-private partnership deal. Originally this was for a period of 30 years, however a subsequent extension has extended the operating agreement to 2031.

Consented scheme

- 3.2.7 The scheme consented by the 2014 Planning Permission has made best use of the existing infrastructure, and this comprises eight key components, which are outlined in **Table 3.1**.

Table 3.1 Components of Luton Airport Expansion

Component	Status
Duelling of the road from the Holiday Inn roundabout to the Central Terminal Area	Complete
Improvements to the public transport hub, adjacent to the terminal	Complete
Construction of a multi-storey car park and pedestrian link on the western side of the existing Short-term Car Park	Complete
Extension to the Mid-term Car Park and Long-term Car Park	Complete
Improvements to the terminal building involving internal re-organisation and minor extensions and building works	Complete
Construction of a new pier (Pier B)	Complete
Construction of a new taxiway parallel to Taxiway Delta	On-going
Taxiway extensions and rationalisation of aircraft parking areas with new stands replacing and improving existing stands	On-going

Source: London Luton Airport Operations Limited, 2020

Changes to the 2014 Planning Permission

- 3.2.8 The 2014 Planning Permission provided consent to allow the capacity of LLA to increase to 18 mppa. According to London Luton Airport Vision for Sustainable Growth 2020-2050¹³, the latest forecasts for LLA anticipated that the 18 mppa capacity was expected to be fully utilised by 2020. The 18 mppa cap on passenger numbers imposed by the 2014 Planning Permission reflected the forecasts at that time, which anticipated that LLA would see a steady rise to around 18 mppa by around 2028. It is important to note, that within the decision notice, LBC acknowledged that the on-site infrastructure of the approved scheme at LLA has the potential to support operational capacity up to 20 mppa.
- 3.2.9 The Applicant is seeking to vary Condition 8 and raise the passenger cap from 18 mppa to 19 mppa. This would ensure that the number of passengers going through LLA could continue to grow over the short-term, and not be restricted by the existing cap. The increase to 19 mppa is likely to be realised by LLA in 2024 rather than the previous projection of 2020 due to the impact COVID-19 has had on the aviation sector.
- 3.2.10 The proposed variation to Condition 10 is driven by the occasional breaches during the summer 2017, summer 2018, and 2019 summer night-time contour. The daytime contour was exceeded in 2019 by 1.4 sq.km at 20.8 sq.km.
- 3.2.11 The Amendments associated with the proposed variation of Condition 10 relate to a request to modify the previous planning permission (15/00950/VARCON).
- 3.2.12 There are no physical or infrastructure changes associated with the proposed variation to Conditions 8 and 10 that would seek to change the external appearance, height, scale, mass, or layout of elements associated with the 2014 Planning Permission.

Proposed Variation to Condition 8

- 3.2.13 In light of the above, it is proposed that variation to Condition 8 is as follows (variations to the existing condition are noted in **red bold text**, with the text to be replaced shown as ~~striketrough~~):

*"At no time shall the commercial passenger throughput of the airport exceed ~~18~~ **19** million passengers in any twelve-month period. From the date of this permission the applicant shall every quarter report in writing to the Local Planning Authority the moving annual total numbers of passengers through the airport (arrivals plus departures). The report shall be made no later than 28 days after the end of each quarter to which the data relates."*

Reason: To ensure growth of the airport can continue, and not be restricted by the existing cap."

Proposed Variation to Condition 10

- 3.2.14 In light of the above, it is proposed that variation to Condition 10 is as follows (variations to the existing condition are noted in **red bold text**, with the text to be replaced shown as ~~striketrough~~):

~~"The development shall be operated in accordance with the Noise report approved on 2 March 2015 (ref: 14/01519/DOC), including providing details of forecast aircraft movements and consequential noise contours as set out in that report."~~

*The area enclosed by the 57dB(A) Leq16hr (0700-2300) contour shall not exceed ~~19.4 sq km~~ **21.6 sq km** for daytime noise, and the area enclosed by the 48dB(A) Leq8hr (2300-0700) contour shall not exceed ~~37.2 sq km~~ **42.9 sq km** for night-time noise, when calculated by the Federal Aviation*

¹³ London Luton Airport Ltd (n.d.). London Luton Airport Vision for Sustainable Growth 2020 – 2050, [online] Available at: <https://www.llal.org.uk/Documents/vision2020-2050.pdf> [Accessed 11 May 2020].

Authority Integrated Noise Model version 7.0-d (or as may be updated and amended) **for the period up to the end of 2027. Post 2027 the area enclosed by the 57dB(A) Leq16hr (0700-2300) contour shall not exceed 15.5 sq km for daytime noise, and the area enclosed by the 48dB(A) Leq8hr (2300-0700) contour shall not exceed 35.5 sq km for night time noise.**

Within ~~five years~~ **12 months** of the commencement of development **the date of this permission** a strategy shall be submitted to the Local Planning Authority for their approval which defines the methods to be used by LLAOL or any successor or airport operator to reduce the area of the noise contours by 2028 for daytime noise to ~~15.2 sq km~~ **15.5 sq km** for the area exposed to 57dB(A) Leq16hr (0700-2300) and above and for night-time noise to ~~31.6 sq km~~ **35.5 sq km** for the area exposed to 48dB(A) Leq8hr (2300-0700) and above.

Forecast aircraft movements and consequential noise contours (Day, Night and Quota Periods) for the forthcoming calendar year shall be reported on the 1st December each year to the LPA, which shall utilise the standard 92 day summer contour."

Reason: To safeguard residential amenity. To accord with the objectives of the Luton Local Plan and the National Planning Policy Framework."

Proposed variation to Condition 22 (Car park management)

3.2.15 The 2014 Planning Permission granted consent to physically extend the car parking facilities as part of the Phase 1 development (out of the total 3 phases of development). The Proposed Scheme does not seek any physical changes to the airport's existing car parking facilities which have already been built out pursuant to the 2014 Planning Permission and are operational. However, an updated Car Parking Management Plan (CPMP) is being provided to support the Proposed Scheme and therefore there is a need to vary Condition 22.

3.2.16 It is proposed that variation to Condition 22 is as follows (variations to the existing condition are noted in **red bold text**, with the text to be replaced shown as ~~striketrough~~):

~~"The car parking areas within Phase 1 shall be constructed and managed in accordance with details approved on 21 January 2016 (ref: 15/00659.)"~~

~~The scheme as approved shall be implemented in full prior to that phase coming into operation. The areas within the application site which are shown to be in use for car parking in the application details shall not be used for any other purpose other than the parking of vehicles by passengers, staff and contractors servicing the airport.~~

The car parking areas within the application site shall be managed in accordance with details provided in the Car Parking Management Plan (document reference 41431MP18V2) to accommodate up to 19 million passengers per annum."

Proposed variation to Condition 24 (Travel plan)

3.2.17 The Proposed Scheme is being accompanied by a new Travel Plan to accommodate the additional 1 mppa, therefore Condition 24 will need to be varied.

3.2.18 It is proposed that variation to Condition 24 is as follows (variations to the existing condition are noted in **red bold text**, with the text to be replaced shown as ~~striketrough~~):

~~"The Passenger and Staff Travel Plan shall be implemented in accordance with the details approved on 23 September 2015 (re: 15/00761/DOC)"~~

The Travel Plan (document reference 41431MP18V2) shall be complied with to accommodate up to 19 million passengers per annum."

Proposed variation to Condition 28 (Approved plans and documents)

- 3.2.19 The Proposed Scheme is being accompanied by updated submissions across a suite of technical evidence-based assessments which would necessitate the variation of Condition 28 as it sets out the approved documentation in support of planning permission.
- 3.2.20 It is proposed that variation to Condition 28 is as follows (variations to the existing conditions are noted in **red bold text**, with the text to be replaced shown as ~~striketrough~~):
- "The development hereby permitted shall not be carried out other than in complete accordance with the approved plans and specifications as set out in the schedule of documents and the Environmental Statement contained in the Terence O'Rourke letters dated 30th November and 14th December 2012 submitted with application 12/01400/FUL and with the following documents:*
- *Noise Impact Assessment, Bickerdike Allen Partners dated 15 May 2015.*
 - *Contour Methodology Update, Bickerdike Allen Partners dated 14 August 2015.*
 - *Environmental Statement Addendum, Terence O'Rourke dated July 2015".*
- 3.2.21 The proposal for 19 mppa is being accompanied by updated submissions across a suite of technical evidence-based assessments which would necessitate the variation of Condition 28 as it sets out the approved documentation in support of planning permission.
- 3.2.22 The proposed variation would read:
- "To accommodate up to 19 million passengers per annum, the development hereby permitted shall not be carried out other than in complete accordance with the approved plans and specifications as set out in the schedule of documents and the Environmental Statement contained in the Terence O'Rourke letters dated 30th November and 14th December 2012 submitted with application 12/01400/FUL and with the following documents:***
- *Noise Impact Assessment, Bickerdike Allen Partners dated 15 May 2015.*
 - *Contour Methodology Update, Bickerdike Allen Partners dated 14 August 2015.*
 - *Environmental Statement Addendum, Terence O'Rourke dated July 2015.*
 - ***Environmental Impact Assessment Volume 1: Non-Technical Statement of Environmental Statement Addendum, Wood (document reference 4143119V3).***
 - ***Environmental Impact Assessment Volume 2: Environmental Statement Addendum, Wood (document reference 4143120V3).***
 - ***Environmental Impact Assessment Volume 3: Environmental Statement Addendum, Wood Appendices (document reference 4143121V3).***
 - ***Planning Statement, Wood (document reference 41431EP12V3).***
 - ***London Luton Airport Master Plan 19 MPPA, IDOM (document reference: Version 2.6. January 2021).***
 - ***Consultation Summary Report, Wood (document reference 41431SF23V3).***
 - ***Drainage and Water Supply Infrastructure Appraisal, Wood (document reference: 41431JG22V2).***

- **Site Waste Management Plan, Wood (document reference: 41431BN6V3).**
- **Site Location Plan, Wood (document reference: As-Built Master Plan).**
- **Terminal Floorplans, Wood (drawing references: TBC).**
- **Transport Assessment, Wood (document reference: 41431MP17V2).**
- **Travel Plan, Wood (document reference: 41431MP18V2).**

3.2.23 The Proposed Scheme includes variations to Condition 22 (car park management), Condition 24 (travel plan), and Condition 28 (approved plans and documents, this includes the updated car parking management plan and updated travel plan). These will not alter the parameters of LLA nor have impacts on the environment as such, and so these variations are not assessed within the ES.

3.3 Planning context and conditions

Planning history

- 3.3.1 In December 2012, an application was submitted to LBC to initiate the expansion of LLA, which would improve passenger facilities and extend the capacity of the airport to 18 mppa by 2028 (reference 12/01400/FUL).
- 3.3.2 A full description of the 2014 Planning Permission comprises the following:
- "Full planning application for dualling of airport way / airport approach road and associated junction improvements, extensions and alterations to the terminal buildings, erection of new departures / arrivals pier and walkway, erection of a pedestrian link building from the short-stay car park to the terminal, extensions and alterations to the mid-term and long-term car parks, construction of a new parallel taxiway, extensions to the existing taxiway parallel to the runway, extensions to existing aircraft parking aprons, improvements to ancillary infrastructure including access and drainage, and demolition of existing structures and enabling works. Outline planning application for the construction of a multi-storey car park and pedestrian link building (all matters reserved)."*
- 3.3.3 The planning application was validated by LBC on 3 December 2012 and consented, subject to 30 conditions and a S106 legal agreement, on 23 June 2014.
- 3.3.4 Subsequently, an application (reference - 12/01400/AMEND) was submitted to LBC for a non-material amendment. This application included modifications to the alignment of Airport Way, update to the arrangement of the Central Terminal Area, reduction in floor space created in terminal building, and modification to from extension due to requirements to move the lifts. Permission was granted in May 2015.
- 3.3.5 Following this, the Applicant submitted an application (reference – 15/00950/VARCON) in June 2015 to vary Condition 11 of the 2014 Planning Permission. This was consented by LBC in October 2017. It is important to note that within the decision notice for permission reference 15/00950/VARCON, conditions were carried forward from the 2014 Planning Permission (12/01400/FUL) or, as amended, where they have been discharged / partially discharged previously, resulting in a different numbering system being applied.
- 3.3.6 For more information on the Planning Context, please refer to the accompanying Planning Statement (document reference number: **41431EP12V103**).

Planning condition

Condition 8

- 3.3.7 The growth to 19 mppa could be accommodated without any new on-airport infrastructure, including that which is already permitted and not yet built, and that which could be built under permitted development rights. The growth to 19 mppa would, therefore, not require any new built development. However, a small increase in the number of ATMs is required to accommodate the additional passengers.
- 3.3.8 **Table 3.2** shows that to accommodate 19 mppa in 2024, the total peak day ATMs would be consistent with the movements to accommodate both the 2019 18 mppa scenario and the 2024 18 mppa scenario (483). For the 2024 19 mppa scenario, no change in movements would occur because additional passengers would be accommodated through higher levels of patronage on each individual aircraft. However, they would then reduce by 6 movements (-1.24%) from the 2019 18 mppa scenario / 2024 18 mppa scenario by 2028 for the 19 mppa scenario as larger planes are introduced.

Table 3.2 Peak Day Air Transport Movements 2019 to 2028*

Peak day	18 mppa						19 mppa	
	2019 ATMs	2020 ATMs	2021 ATMs	2022 ATMs	2023 ATMs	2024 ATMs	2024 ATMs	2028 ATMs
Daytime	417	417	417	417	417	417	419	413
Night-time	66	66	66	66	66	66	64	64
Daily total	483	483	483	483	483	483	483	477

*'Peak day' ATMs: the busiest day in terms of the number of ATMs.

- 3.3.9 **Table 3.3** shows that during the 92-day peak period, accommodating 19 mppa in 2024 would result in an increase of 598 (1.71%) daytime ATMs over the 92-day period, with an increase in the night-time ATMs of 218 (4.08%) and an increase in the daily total of 816 (2.02%), when comparing against 18 mppa in 2024 scenario. There would, however, be a corresponding reduction in ATMs outside of the 92-day peak period.

Table 3.3 92-Day Peak Period Air Transport Movements 2019 to 2028*

92-day peak period	18 mppa						19 mppa	
	2019 ATMs	2020 ATMs	2021 ATMs	2022 ATMs	2023 ATMs	2024 ATMs	2024 ATMs	2028 ATMs
Daytime	34,124	34,124	34,391	34,706	35,003	34,391	34,989	34,848
Night-time	5,398	5,398	5,131	4,994	4,997	5,131	5,349	5,003
Daily total	39,522	39,522	39,522	39,700	40,000	39,522	40,338	39,851

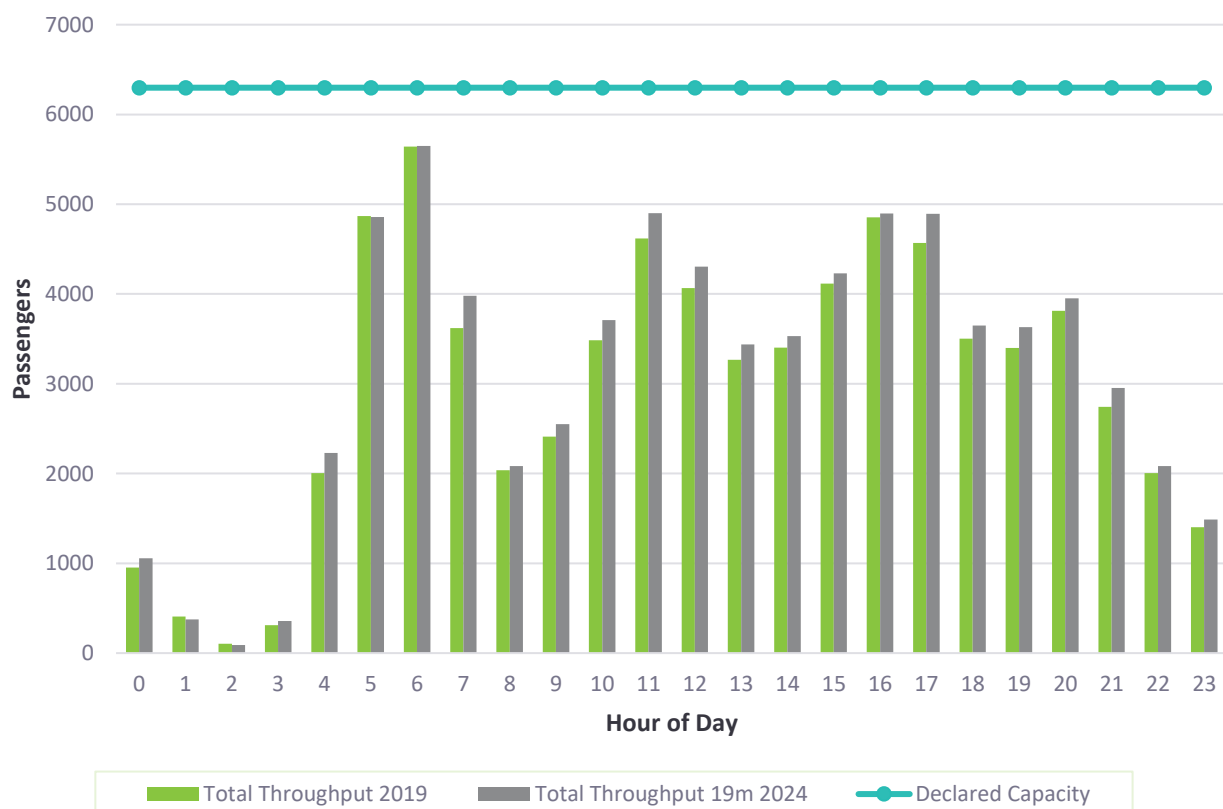
*'92-day peak period' ATMs: the 92-day period within which the highest number of ATMs occurs.

- 3.3.10 As shown in **Table 3.2** and **Table 3.3**, ATMs would increase to accommodate the additional passengers, but this would not be at the same rate of increase as the passenger numbers (5.26%). This can be achieved by increasing seat occupancy, and seat numbers by using larger aircraft.
- 3.3.11 In addition to the above, there will be no major change in the direction of flights. This is due to the short haul point-to-point nature of LLA and as such, the majority of flights will remain in the "East-North-East" to "South-South-West" sectors. The nature and direction of flights is not expected to change as a result of the Proposed Scheme.

Passenger throughput

- 3.3.12 The Proposed Scheme will not result in an increase in the peak passenger throughput or staff numbers. LLAOL manage planning constraints relating to night quotas, noise contours, and annual passenger numbers through a capacity declaration on slot usage, which dictates maximum hourly runway movements, maximum hourly and multi-hourly terminal passenger throughput. Notwithstanding the increase in capacity to 19 mppa, LLAOL will maintain the hourly and two hourly declared terminal passenger flow capacity that was submitted to Airport Coordination Limited (ACL) for 18 mppa in Summer 2019. It is understood that LLAOL will only review and, therefore, potentially increase the declared terminal passenger flow capacity if there is a change in the physical infrastructure of the airport, and this will not occur due to the Proposed Scheme. An estimation of hourly passenger throughput for the busiest slot usage day during 2019 (approximately 18 mppa) and 2024 (estimated 19 mppa scenario) has been provided by LLAOL within **Graphic 3.1**.

Graphic 3.1 2019 (c.18 mppa) and estimated 2024 (19 mppa scenario) hourly arrival and departure passenger hourly throughput based on aircraft slot usage



- 3.3.13 As shown in **Graphic 3.1**, the hourly passenger throughput (arrivals and departures) for 6 am is the maximum recorded on the busiest day in 2019. **Graphic 3.1** also shows that this will remain the

same when capacity is increased from 18 mppa to 19 mppa and, therefore, maximum passenger numbers will not be exceeded within either permission.

Condition 10

- 3.3.14 Consent is also sought for a variation to the wording of Condition 10 of the 2014 Planning Permission in order to provide a less restrictive daytime and night-time noise contour.
- 3.3.15 It is understood that Condition 10 was set on the basis of noise modelling carried out for the 2014 Planning Permission. However:
- since the time of this modelling, LLA has experienced unprecedented levels of growth in passenger numbers, which are considerably above those predicted, reflecting the success of LLA as a destination, and
 - in addition to the above, the original noise modelling took into account the fleet modernisation information that was available at that time. It was anticipated that the aircraft fleet using LLA would be modernised and therefore become quieter over time.
- 3.3.16 The original noise modelling only took into account the effects of modernisation with respect to the assessment in 2028, by which time it was assumed that the resident airlines would have acquired all of the ordered NEO and MAX aircraft. As such, little or no headroom was included for unforeseen circumstances outside of the control of the operator of LLA. There are a number of reasons why forecasting fleet modernisation is difficult to predict, including:
- the speed of manufacture;
 - whether an Operator chooses to base or use aircraft at LLA, instead of at another airport in its network;
 - whether an aircraft is permitted to fly;
 - the financial situation of an operator and whether they order as many as forecasted; and
 - the likelihood of manufacturers producing re-engined aircraft.
- 3.3.17 It is acknowledged that the expected reductions in noise levels have not been forthcoming to the extent envisaged, and it is taking longer than anticipated to achieve the mandated noise levels, resulting in breaches of Condition 10. This has been due to the delay in the manufacture of Airbus Neo aircraft, because of the unavailability of Pratt and Whitney engines, and from the grounding of Boeing 737Max aircraft due to safety concerns. This has meant that there are lower numbers of new generation aircraft at LLA, compared to the initial assumptions made as part of the 2028 forecast in the noise modelling for the 2014 Planning Permission.
- 3.3.18 The forecast of the fleet modernisation for each of the scenarios assessed (this includes a 'without development' scenario) within this ES Addendum is presented in **Appendix 3A in Volume 3: Figures and Appendices**. This is based on current replacement schemes of the airlines using LLA and has considered the financial incentive offered by the Proposed Scheme for airlines to utilise the increased passenger / flight quotas available and so invest further in their fleet.
- 3.3.19 LLA is therefore seeking a variation to Condition 10. The proposed variation to Condition 10 seeks to increase the area enclosed by the contours for daytime and night-time noise. The proposed variation is driven by the occasional breaches during the summer 2017 night-time contour, 2018 summer night-time contour, and 2019 night-time contour. The daytime contour was exceeded in 2019 by 1.4 km² at 20.8 km².

- 3.3.20 The proposed Amendments will enable the area enclosed by the 57 dB(A) $L_{Aeq16hr}$ daytime (0700-2300) noise contour to increase from 19.4 km² to 21.6 km²; and the area enclosed by the 48 dB(A) L_{Aeq8hr} (2300-0700) night-time noise contour to increase from 37.2 km² to 42.9 km² for the period up to the end of 2027. The change to the noise contours is shown in **Figure 8.15** and **Figure 8.16** in **Volume 3: Figures and Appendices**.
- 3.3.21 At the end of 2027, Condition 10 will require LLAOL or any successor or airport operator to reduce the area of the noise contours for daytime noise to 15.5 sq km for the area exposed to 57 dB(A) L_{eq16hr} (0700-2300) and above and for night-time noise to 35.5 sq km for the area exposed to 48 dB(A) L_{eq8hr} (2300-0700) and above. The change to the noise contours is shown in **Figure 8.9** and **Figure 8.10** in **Volume 3: Figures and Appendices**.
- 3.3.22 **Table 3.4** presents the total forecast passengers at the time of the 2014 Planning Permission against the updated passenger forecasts. The table shows that the 2012 ES, passenger growth was forecast to be slower than that which has occurred and in 2018 Luton Airport handled an additional 4 mppa passengers than expected.

Table 3.4 Annual passenger forecasts from 2014 Planning Permission Vs. latest updated forecasts

Year	Forecast in 2012 (mppa)	Actual mppa (A) / Updated Forecast (t) (mppa)
2016	11.7	14.6 A
2017	12.1	15.8 A
2018	12.6	16.6 A
2019	12.9	18.0 A
2020	13.4	5.5 A
2021	14.3	13.6 +
2022	14.8	18.0 +
2023	15.4	18.0 +
2024	15.8	19.0 +
2025	16.6	19.0 +
2026	17.3	19.0 +
2027	17.7	19.0 +
2028	17.8	19.0 +

Source: London Luton Airport Operations Limited, 2020

Notes: A - Actual passenger numbers

† - Forecast passenger numbers

- 3.3.23 As shown in **Table 3.4**, there has been significant growth in passenger numbers, which has exceeded those predicted in the 2014 Planning Permission (with respect to years reached), and LLA will reach the 18 mppa passenger cap nine years earlier than anticipated. Although passenger numbers have decreased during 2020 as a result of COVID-19, LLA have forecasted that passenger levels could realistically return to 18 mppa in 2023 (see **Section 2.2**). A combination of factors, including the more rapid growth in aircraft movements outpacing the deployment of next generation aircraft, aircraft noise reductions being less effective than anticipated for those aircraft that have been introduced, and air traffic delays across Europe which have resulted in a breach of the summer night-time noise contour area limit for 2017, 2018, and summer daytime and night time in 2019.
- 3.3.24 Irrespective of these factors, the forecasts for 2018 and 2019 were exceeded for the night-time contour limit, and the daytime 57 dB contour was marginally exceeded in 2019 by 1.4 sq.km at 20.8 sq.km. **Table 3.5** presents the noise contour area for 2017 alongside the contour area limit for 2018 and 2019. This shows that the Applicant breached the night-time contour limit by 1.5 sq.km in 2017.

Table 3.5 Noise contour limits

	Daytime (km ²)	Actual & Forecast summer daytime movements	Night time (km ²)	Actual & Forecast summer night-time movements
CURRENT LIMIT (2014-2028, and 2028+)	19.4	-	37.2	-
FUTURE EXISTING LIMIT (2021-2027)	21.6	-	42.9	-
ACTUAL NOISE CONTOUR AREA (2017)	19.0	-	38.7	-
ACTUAL NOISE CONTOUR AREA (2018)	19.4	-	40.2	-
ACTUAL NOISE CONTOUR AREA (2019)	20.8	34,124	44.0	5,398
FORECAST NOISE CONTOUR AREA (2020)	12.2	17,365	28.8	2,658
FORECAST NOISE CONTOUR AREA (2021)	21.6	34,391	42.9	5,131
FORECAST NOISE CONTOUR AREA (2022)	21.1	34,706	42.1	4,994
FORECAST NOISE CONTOUR AREA (2023)	20.4	35,003	41.9	4,997
FORECAST NOISE CONTOUR AREA (2024, 18 mppa)	16.7	34,391	37.2	5,131

	Daytime (km ²)	Actual & Forecast summer daytime movements	Night time (km ²)	Actual & Forecast summer night-time movements
FORECAST NOISE CONTOUR AREA (2024, 19 mppa)	19.4	35,331	39.8	5,007
FORECAST NOISE CONTOUR AREA (2028, 19 mppa)	15.5	34,849	35.5	5,002

Source: London Luton Airport Operational Limited, 2020

3.4 Waste management

- 3.4.1 A Site Waste Management Plan (SWMP) has been produced to determine the potential impacts of waste arisings associated with an increase from 18 mppa to 19 mppa (document reference **41431BNV2**).
- 3.4.2 The Proposed Scheme is estimated to result in operational waste arisings of 2,630 tonnes/annum and there are no expected changes to the type of activities generating waste. Operational waste arisings for 19 mppa are therefore assumed to be of a similar character and derived from the same sources as the existing waste arisings. The SWMP suggests that compared to 18 mppa, an additional 1 mppa would result an increase in operational waste arisings of between 56 to 138 tonnes/annum, or 2% to 6% (depending on the baseline used for passenger waste rates: i.e. the 2011 rate for the 2014 Planning Permission, or the most recent 2019 rate). This indicates that there would be a slight to moderate impact on total waste arisings under the 19 mppa proposals, and minimal impact on the day-to-day management of operational waste, which is expected to be within the capacity of existing infrastructure at the airport. In addition, objectives for improved management and minimisation of waste at the airport are outlined in LLA's latest Sustainability Strategy¹⁴, with targets to reduce passenger waste rates that should further reduce the impact of the 19 mppa proposals on waste arisings.
- 3.4.3 To ensure effective management of operational waste associated with the increased passenger capacity, all possible care would be taken to follow the waste hierarchy, minimising waste arisings from the airport by optimising opportunities to reduce, reuse, recycle and recover waste materials. Actions for waste management good practice in-line with the waste hierarchy are outlined in the SWMP. These include responsibilities under duty of care; appropriate segregation, storage, and treatment of specific wastes; measuring and monitoring; and incorporation of waste targets from the Sustainability Strategy. The actions proposed within the SWMP reinforce existing waste management procedures at LLA, ensuring the airport will continue to achieve targets for recycling and diverting waste from landfill, and providing the basis for the effective management of operational waste for 19 mppa.
- 3.4.4 The Applicant has determined that for an increase to 19 mppa there is sufficient capacity within the airport's existing infrastructure for routine operational waste arisings. The planning application does not include any physical changes to the airport terminal building and surrounding infrastructure; therefore, no waste is expected to be generated by construction, demolition, or excavation activities.
- 3.4.5 The SWMP demonstrates that existing procedures for management of waste generated by the airport's operations have delivered a reduction in passenger waste rates and are consistent with the

¹⁴ London Luton Airport Limited. Sustainability strategy, 2019, [online]. Available at: <https://www.llal.org.uk/Documents/Luton-Airport-sustainability-strategy.pdf> [Accessed November 2020].

principles of the waste hierarchy; these will continue to be applied to operations for 19 mppa. The actions proposed within the SWMP reinforce existing waste management procedures at LLA, ensuring the airport will continue to achieve targets for recycling and diverting waste from landfill, and providing the basis for the effective management of operational waste for 19 mppa.

3.5 Operational control measures

3.5.1

As discussed in the previous section, there are no proposed design changes associated with the Proposed Scheme. As such, there is limited opportunity to embed mitigation measures through the Proposed Scheme. However, following the first breach of Condition 10 in 2017, the Applicant took immediate action to reduce the number of flights to LLA and in March 2018 produced an Action Plan. The Action Plan details operational control measures the Applicant has set to ensure that no further exceedances of the existing Condition 10 would occur. These control measures will continue to be in applied for the Proposed Scheme. Additional control measures have been developed and will apply to the Proposed Scheme. The current restrictions include:

Removal of ad-hoc slot applications between 22:00-05:59 GMT 1 June and 30 September

- The movements occurring in the night-time period can increase due to off-schedule activity such as late arriving aircraft caused by industrial disputes in mainland Europe, staff shortages, capacity issues and severe weather events. These additional movements can contribute to the exceedance of the night-time contour. LLAOL have therefore removed the ad-hoc slot applications during this period. This provides a proportionate buffer for any late arrivals in the summer period to guard against contour breaches. Late arrivals due to weather disruption are beyond the airport's control.

No further night slots to be allocated to series flights between 22:00-05:59 GMT 1 June and 30 September

- No further growth to scheduled night-time traffic, commercial or cargo will be permitted. Whilst capacity is available in this period, LLAOL have placed this restriction to prevent any further growth ahead of aircraft fleet modernisation. LLAOL have taken this step, as noise modelling suggests that any increase in movements in the night-time period without aircraft modernisation may contribute to further breaches of the condition.

No rescheduling of existing allocated slots from the day-time (06:00-21:59 GMT) into the night-time (22:00-05:59 GMT) between 1 June and 30 September

- This particularly refers to the early morning shoulder period which is currently full. This restriction means that operators will not be able to move existing slots from post 06:00 GMT to before 06:00 GMT thereby ensuring no further increase in night-time movements.

No non-emergency diverted flights accepted during daytime (06:00-21:59 GMT) and night-time (22:00-05:59 GMT) between 1 June and 30 September

- This ensures that LLAOL minimise any additional unplanned movements that could affect the noise contour and that airlines do not use LLA as a diversion airport in the event that they cannot land at the original port of destination. However, LLA will remain available to emergency diverts and life critical movements.

Zero flow rate between 05:00-05:59 GMT 1 June and 30 September

- This will ensure that aircraft scheduled for arrival in the day-time period close to the early morning shoulder threshold do not actually arrive in the night-time period.

QC2 aircraft ban

- QC2 aircraft will no longer be permitted to operate at night-time to or from the airport.

No aircraft with a value greater than QC1 permitted to operate in the night-time period (22:00-05:59 GMT) / No further day-time (06:00-21:59 GMT) slot to be allocated to aircraft greater than QC1 between 1 June and 30 September

- Condition 9(i) of the 2014 Planning Permission requires the voluntary phase out of these aircraft by 2028. However, LLAOL has decided to meet the standards set out in this condition in relation to the night-time period from summer 2019 and for all subsequent seasons, removing the noisiest aircraft from the night-time period.

No equipment changes on existing allocated slots that would involve replacing an aircraft with a QC value of 1 or less with an aircraft with a QC value greater than 1 between 06:00-21:59 GMT 1 June and 30 September

- This will stop airlines from changing aircraft after slots have been approved. The intention is that this will provide greater assurance between the noise modelling forecast and actual noise through fewer changes that generate additional noise.

Incentivise aircraft fleet modernisation with differential charging

- Differential charging was implemented from 2019 to incentivise the rapid modernisation of fleet. The intention is to structure the charging mechanism in such a way that incentivises fleet modernisation and use of next generation aircraft as part of the LLA operation.

Increased frequency and detailed cooperation between the Flight Operations Department and the Business Development Department in LLAOL

- This ensures that the Flight Operations Department works closely with the Business Development Department to ensure that passenger growth is managed more effectively in line with noise limitations.

3.5.2

Additional restrictions will be put in place for the Proposed Scheme to ensure that noise levels decrease year on year, the following commitments will be made as part of the Proposed Scheme:

- For Summer 2021 and all subsequent seasons, no night-time slots (22:00 to 05:59 GMT) will be allocated to aircraft with a quota count (QC) value greater than 1;
- No further daytime slots will be allocated to aircraft with a QC value greater than 1 (06:00 to 21:59 GMT) between 1 June and 30 September;
- No further night slots to be allocated to series flights (22:00-05:59 GMT) between 1st June and 30th September;
- No new slot applications with an aircraft QC value greater than 0.5 will be permitted between 22:00 and 05:59 GMT;

- Only scheduled arriving aircraft will be accepted between 04:45 and 06:00 GMT. All other arriving aircraft must land after 06:00 GMT, arrivals earlier than the scheduled arrival time will not be accepted; and
- No re-scheduling of existing allocated slots from the day time (06:00 to 21:59 GMT) into the night-time (22:00 to 05:59 GMT) 1 June – 30 September.

Monitoring

3.5.3 The conditions attached to the 2014 Planning Permission referred to preparing a Noise Control Monitoring Scheme. If the proposed variation to Conditions 8 and 10 are granted, the Applicant will maintain its commitment to noise monitoring. A Noise Action Plan¹⁵ has also been prepared to manage, mitigate, and minimise aircraft noise and includes the following items:

- operational procedures;
- quieter aircraft;
- land-use planning and mitigation;
- operational restrictions; and
- working with the local community and industry.

3.5.4 The latest Noise Action Plan for 2019 – 2023 was approved by Central Government. The Noise Action Plan is explained further within the relevant technical chapters of the ES.

¹⁵ London Luton Airport. Noise Action Plan 2019 – 2023 [online]. Available at: <https://www.london-luton.co.uk/corporate/community/noise/noise-action-plan> [Accessed November 2020].

4. Approach to preparing the Environmental Statement

4.1 The Environmental Impact Assessment process

- 4.1.1 The preparation of the ES is one of the key stages in the EIA process, as it brings together information about any likely significant environmental effects, which LBC will use to inform its decision about the Proposed Scheme.

4.2 EIA terminology

Impacts and effects

- 4.2.1 The convention used in this ES is to use 'impacts' only within the context of the term EIA, which describes the process from scoping through ES preparation to subsequent monitoring and other work. Otherwise, this document uses the word 'effects' when describing the environmental consequences of the Proposed Scheme. For example, such effects may come about as a result of the following:
- Physical activities that would take place if the development were to proceed (e.g. vehicle movements during construction operations); or
 - Environmental changes that are predicted to occur as a result of these activities (e.g. loss of vegetation prior to the start of construction work or an increase in noise levels). In some cases, one change causes another change, which in turn results in an environmental effect.
- 4.2.2 The predicted environmental effects are the consequences of the environmental changes for specific environmental receptors. For example, with respect to bats, the loss of roosting sites or foraging areas could affect the bats' population size; with regard to people, an increase in noise levels could affect people's amenity.
- 4.2.3 This ES is concerned with assessing the significance of the environmental effects of the Proposed Scheme, rather than the activities or changes that cause them. However, this requires these activities to be understood and the resultant changes identified and quantified, often based on predictive assessment work.

Spatial and temporal scope

- 4.2.4 Spatial scope is the area over which changes to the environment are predicted to occur as a consequence of a Proposed Scheme. In practice, an EIA should focus on those areas where these effects are likely to be significant.
- 4.2.5 In this ES, the spatial scope varies between environmental topics and is therefore described in each of the topic chapters. For example, the spatial effects of a development on noise will probably cover a much greater area to that affected by transport.
- 4.2.6 The temporal scope covers the time period over which changes to the environment and the resultant effects are predicted to occur and are typically defined as either being temporary or permanent.

4.3 EIA screening

- 4.3.1 A formal Screening Opinion was sought from LBC for the variations associated with the Proposed Scheme. Consideration against the criteria set out in Schedule II of the 2017 EIA Regulations is shown in **Table 4.1**. This indicated that the Proposed Scheme met threshold (i) of paragraph 13(b) and has the potential to have significant effects on the environment, due to the characteristics, location, and potential impact.

Table 4.1 Schedule 2 thresholds and criteria of the 2017 EIA Regulations

Column 1: Description of development	Column 2: Applicable thresholds and criteria
13. Changes and extensions	
<i>"(a) Any change to or extension of development of a description listed in Schedule 1 (other than a change or extension falling within paragraph 24 of that Schedule) where that development is already authorised, executed or in the process of being executed."</i>	<p><i>"Either-</i></p> <p><i>(i) The development as changes or extended may have significant adverse effects on the environment; or</i></p> <p><i>(ii) in relation to development of a description mentioned in a paragraph in Schedule 1 the thresholds and criteria in column 2 of the paragraph of the table applied to the change or extension are met or exceeded."</i></p>
<i>"(b) Any change to or extension of development of a description listed in paragraphs 1 to 12 of column 1 of this table, where that development is already authorised, executed or in the process of being executed."</i>	<p><i>"Either-</i></p> <p><i>(i) The development as changed or extended may have significant adverse effects on the environment; or</i></p> <p><i>(ii) in relation to a development of a description mentioned in column 1 of this table, the thresholds and criteria in the corresponding part of column 2 of this table applied to the change or extension are met or exceeded."</i></p>

- 4.3.2 The Proposed Scheme was screened against the criteria set out in Schedule III of the 2017 EIA Regulations, and LBC in their Screening Opinion (reference: 20/00826/EIASC¹⁶) considered that, due to resultant noise impact, the Proposed Scheme is likely to have a significant environmental effect, which has the potential to harm human health. Therefore, the Proposed Scheme was classed as an EIA development and required the environmental effects of the proposal to be evaluated through the EIA process and presented in an ES.

4.4 EIA scoping

Introduction

- 4.4.1 Scoping involves identifying the following:
- the people and environmental resources (collectively known as 'receptors') that could be significantly affected by the Proposed Scheme;
 - what aspects of the Proposed Scheme those receptors might be affected by; and
 - the work required to take forward the assessment of these potential likely significant effects.

¹⁶ Screening application [online]. Available at: <https://planning.luton.gov.uk/online-applications/applicationDetails.do?keyVal=QDGC7HKG05100&activeTab=summary>

- 4.4.2 Our approach for this ES involved scoping being started at the outset of our work on the EIA, with the initial conclusions about the potential likely significant effects of the Proposed Scheme set out in a Scoping meeting (discussed with LBC, **Appendix 1C** in **Volume 3: Figures and Appendices**). The preparation of the Scoping Presentation was informed by information about the legislative and policy context relevant to the Proposed Scheme alongside a review of the 2014 Planning Permission's 2012 ES. It was also informed by the simple rule that, to be significant, an effect must be of sufficient importance that it should influence the process of decision-making about whether or not consent should be granted for the Proposed Scheme or an element of it. In this ES, this is referred to as the 'significance test'.
- 4.4.3 At the scoping stage, early identification of potentially significant effects is drawn utilising the significance test. These are based upon professional judgement, with reference to the Proposed Scheme's description and justification (**Chapter 3: Description of the Proposed Scheme**), drawing upon, as appropriate, available information about:
- the magnitude and other characteristics of the potential changes that are expected to be caused by the Proposed Scheme;
 - the sensitivity of receptors to these changes;
 - the duration of the changes;
 - the effects of these changes on relevant receptors;
 - the value of receptors; and
 - the spatial area over which changes may occur.
- 4.4.4 If the information that is available at the scoping stage does not enable a robust conclusion to be reached that a potential effect is not likely to be significant, the effect is then taken forward for further assessment.
- 4.4.5 Due to the limited nature of the proposed changes, the Applicant agreed with LBC that the scope was to be discussed in a meeting with LBC. The Scoping meeting (**Appendix 1C** in **Volume 3: Figures and Appendices**) set out what had been identified to be the potentially significant environmental effects for consideration in the ES and the approach to undertake the assessments. From the Scoping meeting, LBC and the Applicants team agreed that the environmental topics that will be assessed for each condition variation, as presented in **Table 4.2**.

Table 4.2 Environmental topics to be assessed as part of each condition variation

Environmental topic	Proposed variations	
	Condition 8 passenger throughput cap	Condition 10 noise contours
Air quality	Yes	No
Climate	Yes	No
Human health	Yes	Yes
Noise	Yes	Yes
Transport	Yes	No

- 4.4.6 Alongside this, it identified that the Proposed Scheme was unlikely to cause significant changes to the risks associated with: Biodiversity; Ground conditions; Historic environment; Landscape and visual; Major accidents and disasters; Socio-economics effects; Waste and resource use, and Water resource and flood risk, and as such recommended that these topics were scoped out of the EIA.
- 4.4.7 As such, the scope of the EIA has been progressively refined in response to comments from LBC (refer to **Section 4.4**), together with environmental information that has been obtained from assessment work carried out as part of the EIA.
- 4.4.8 The environmental topic chapters (**Chapters 6 - 10**) detail the final scope of the assessment in relation to effects assessed as potentially significant, which therefore require an in-depth detailed assessment. In some cases, effects that could be scoped-out (because they are considered not likely to be significant) have been scoped-in because further information is required to justify and explain this. All other effects (i.e. those which are not referred to in the environmental topic chapters) are not likely to be significant.

Topics scoped out from further assessment

- 4.4.9 As reported in the Scoping meeting (**Appendix 1C** in **Volume 3: Figures and Appendices**), the following topics have been scoped out from further assessment, as there is limited scope for likely significant effects as a result of the Proposed Scheme.
- 4.4.10 The following topics have been scoped out of this assessment:
- Biodiversity;
 - Ground conditions;
 - Historic environment;
 - Landscape and visual effects;
 - Major accidents and disasters;
 - Socio-economics;
 - Waste and resource use; and
 - Water environment.

Biodiversity

- 4.4.11 There are no material changes proposed, which seek to alter the overall built infrastructure of the airport. The increase in ATMs as a result of the increase in passengers would be minor and the direction of flights will remain the same, so there will be no change to the spatial pattern of ATMs, meaning there will not be an introduction of new ecological sites that could be sensitive to changes in noise.
- 4.4.12 There are no statutory sites within 5 km of LLA, including within the proposed noise contour limit. Knebworth Woods is a Site of Special Scientific Interest (SSSI) approximately 8 km east of the airport, the qualifying feature of Knebworth Woods is almost all ancient in origin and is ecologically diverse with rides, ponds, and small areas of both acidic and neutral grassland. Galley and Warden Hills SSSI, located approximately 6 km north of the Site, has been designated for calcareous grassland and plants which are not considered to be sensitive to changes in noise.
- 4.4.13 At this location, it is likely that aircraft will be at a sufficient height and distance whereby emitted noise is low enough to be considered as to not have a significant effect. As such, there is unlikely to

be a change in significant effects on the ecological environment that would require further consideration. The **biodiversity topic has been scoped out from further assessment**.

Ground conditions

- 4.4.14 The 2012 ES highlighted that during the construction phase, following the implementation of mitigation measures, that 'none of the residual effects are likely to be significant, as all potential effects are reduced to slight or negligible'. During operation, it was noted that the most likely source of surface and groundwater contamination was from fuel oils, de-icing compounds, and firefighting foam, for which there are existing control mechanisms in place. As such, no significant effects were expected.
- 4.4.15 The Proposed Scheme will not change the nature of the construction works associated with the 2014 Planning Permission, which are ongoing. There are no additional construction requirements associated with the Proposed Scheme, therefore no additional contamination risks, dust generation, or increased excavation activity are anticipated. Similarly, operational activities are not anticipated to change, so risks due to site contamination, and contamination of controlled waters remain. Therefore, no additional significant effects would require further consideration.
- 4.4.16 As there are no additional significant effects anticipated as a result of the Proposed Scheme, the conclusions made within the 2014 Planning Permission 2012 ES remain valid and the **ground conditions topic has been scoped out from further assessment**.

Historic environment

- 4.4.17 There are no material changes associated with the Proposed Scheme, which seek to alter the overall built infrastructure of the airport.
- 4.4.18 The increase in ATMs as a result of the increase in passengers due to the variation of Condition 8 would be minor and the direction of flights will remain the same, so there will be no change to the spatial pattern of ATMs. Therefore, there would only be a negligible impact from the increase to 19 mppa from in-air and ground aircraft noise, and road traffic noise. There will therefore only be a negligible change to the noise environment at designated sites due to the variation to Condition 8.
- 4.4.19 As reported in the 2014 Planning Permission 2012 ES, during the operational phase there would be no significant effects through a change to setting, resulting from the additional built development at the airport consented in the 2014 Planning Permission.
- 4.4.20 The 2012 ES did assess potential effects to the scheduled monument at Someries Castle as being of slight to moderate significance. The assessment also concluded that the development may affect Luton Hoo House, and registered parkland and listed buildings within the surrounding area. The degree of the effect to Luton Hoo House was assessed as slight, while effects to listed buildings were assessed as slight to negligible. The proposed variation to Condition 10 proposes the equivalent of a 1 dB change; a change in noise of 1 dB in the short-term is the smallest that is considered perceptible and is therefore considered negligible. The 2014 Planning Permission 2012 ES considered that a change in aircraft noise of 1 dB has 'no effect'. As such, the conclusions of the 2012 ES would not be altered as a result of the Proposed Scheme.
- 4.4.21 There are no Scheduled Monuments, World Heritage Sites, Registered Battlefields, or Registered Parks and Gardens located within the proposed noise contour limit. However, there are a number of listed buildings located within this area.
- 4.4.22 The nature of the proposed variation to Condition 10 will not result in a reduction or increase of any effect as assessed in the 2014 Planning Permission 2012 ES. There is not expected to be an increase in noise over 1 dB affecting listed buildings or their settings, so any increase would not be

considered perceptible. Therefore, the increase in noise (if any) would not affect any listed buildings or their settings and there are no additional significant effects that would require further consideration as a result of the proposed variation to Condition 10. The **historic environment topic has been scoped out from further assessment**.

Landscape and visual effects

- 4.4.23 Guidance¹⁷ states that in the consideration of exercising or performing of air navigation functions 'in relation to, or so as to affect, land in National Parks and AONB' the statutory purpose of those areas should be given due regard. The proximity of the Chilterns AONB is unlikely to be the subject of any significant noise effects, regardless of contours being sited closer to the boundary of the AONB. The height of aircraft passing over the AONB varies depending on location; between Hitchin and Toddington aircraft fly at an average of 5,000 ft, while between Ivinghoe and Berkhamsted arrivals average 4,000 ft and departures 8,000 ft. In all instances, this is above the 4,000 ft threshold whereby effects are deemed to be insignificant. The Proposed Scheme will result in no change to this prescribed flight height, or present flight paths taken by aircraft. Moreover, current guidance also states that '*given the finite amount of airspace available, it will not always be possible to avoid overflying National Parks or AONB, and there are no legislative requirements to do so as this would be impractical*'. As such, it is not expected that there will be any effects requiring further assessment.
- 4.4.24 It should be acknowledged that there will be a slight increase in the extent of the 57 dB daytime noise contour over the Chilterns AONB for the 2024 19 mppa scenario, however this will decrease in the 2028 19 mppa scenario. Nonetheless, the results of the screening assessment for noise have shown that there would be a negligible impact from the increase to 19 mppa from 18 mppa from in-air and ground aircraft noise, and road traffic noise on designated sites. There will, therefore, only be a negligible change to the noise environment at designated sites.
- 4.4.25 Moreover, we consider there are no areas within proximity to LLA that would be referred to in the NPPF as being prized for their recreational and amenity value. Consequently, there is no requirement to undertake assessments considering the likely effects upon open spaces and quiet areas.
- 4.4.26 There are no material changes associated with the Proposed Scheme that seek to alter the overall built infrastructure of the airport. In addition, the increase in ATMs as a result of the increase in passengers would be minor and the direction of flights will remain the same, so there will be no change to the spatial pattern of ATMs. Therefore, it is not expected that there will be any landscape and visual adverse effects requiring further assessment in addition to those addressed in the 2014 Planning Permission 2012 ES. The **landscape and visual effects topic has been scoped out from further assessment**.

Major accidents and disasters

- 4.4.27 The assessment of major accidents and disasters is a requirement of the 2017 EIA Regulations and as such, was not assessed as part of the 2014 Planning Permission 2012 ES. Whilst material changes associated with the Amendments are limited to the increase in passenger movements from 18 mppa to 19 mppa and the increase in noise contours, consideration needs to be given to whether this change could arise in likely significant effects.

¹⁷ Department for Transport (2017) Air Navigation Guidance 2017, [online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/653978/air-navigation-guidance-2017.pdf [Checked October 2018].

- 4.4.28 There will be no associated construction works associated with the Proposed Scheme and as such no risk of accident (e.g. indirect effects on existing fuel storage tanks which could initiate a major accident, such as collision with a construction vehicle) will be introduced.
- 4.4.29 A Transport Assessment (TA) accompanies this application and has taken into account the effect of traffic associated with the Proposed Scheme and proposed environmental measures to ensure safety of the network.
- 4.4.30 Flight numbers have increased quicker than anticipated. The number of forecasted aircraft is consistent with the figures assessed as part of the 2014 Planning Permission 2012 ES, only the year in which the increase was anticipated has changed. As with all UK airports, licensing and controls imposed by the Civil Aviation Authority (CAA) are in place, and the slight increase in the number of aircraft movements will operate under the same licensing and controls (e.g. CAA, International Civil Aviation Organisation, and European Union Aviation Safety Agency). Additionally, it is not expected that there will be any alteration to aircraft flightpaths.
- 4.4.31 The control measures imposed at the airport will ensure that the likelihood of a major accident occurring as a result of the Amendments and impacting people, or the environment is limited.
- 4.4.32 The consideration of potential effects above has demonstrated that the Proposed Scheme is unlikely to result in likely significant effects, reflecting the limited changes in the risk profile of the development and the low likelihood of occurrence of an event that could constitute a major accident or natural disaster. Therefore, there are no likely significant effects that would require further consideration in relation to major accidents and disasters, and the **major accidents and disasters topic has been scoped out from further assessment.**

Socio-economics

- 4.4.33 Since there are no material changes to the overall built infrastructure of the airport, or construction activities associated with the Proposed Scheme, there are no changes to the conclusions of the socio-economic assessment within the 2014 Planning Permission 2012 ES and therefore the conclusions of that assessment remain valid.
- 4.4.34 The 2012 ES assessed the effects upon employment and the local economy during operation of the 2014 Planning Permission as substantial and significant. There could be potential for beneficial effects upon employment and the local economy associated with the increase in passenger numbers.
- 4.4.35 Potential environmental effects on community facilities surrounding the Site have been considered. The potential effects that could arise from air quality, health or noise on community facilities have been assessed within the respective assessment chapters.
- 4.4.36 Therefore, as there are no additional significant socio-economic effects that would require further consideration as a result of the Proposed Scheme the conclusions made within the 2014 Planning Permission 2012 ES remain valid, and the **socio-economics topic has been scoped out from further assessment.**

Waste and resource use

- 4.4.37 Since there are no material changes to the overall built infrastructure of the airport there will not be any generation of construction waste, so it is not expected that there will be any significant effects requiring further assessment.
- 4.4.38 An increase in passenger numbers will result in a minor increase in operational waste, which is within the routine capacity of LLA's waste management infrastructure and facilities operated by

their waste management contractors. The management of waste will continue as existing and there are unlikely to be significant effects associated with the operational waste.

4.4.39 As discussed in **Section 3.4**, a Site Waste Management Plan (SWMP) has been produced to support the application. The findings of the SWMP have shown that:

- there will be a slight – moderate impact on total waste arisings due to the additional passengers, and a minimal impact on the day-to-day management of operational waste. Strategies for managing and minimisation of waste at the airport will be outlined, with targets to reduce passenger waste rates;
- there is sufficient capacity within the airport's existing infrastructure for routine operational waste arisings; and
- existing procedures for waste management at the airport will be sufficient to manage the additional waste produced from the increase in passengers.

4.4.40 The variation to Condition 8 will not result in any likely significant effects on waste at the airport and the existing infrastructure at the airport will be able to handle the increase in passengers. Due to the above, the **waste and resource use topic has been scoped out from further assessment**.

Water environment

4.4.41 LLA comprises of large impermeable areas associated with the runway, taxiways, and apron, as well as buildings and large car parking areas. The rest of the airport, including the land between and around the runway and taxiways is short, maintained grass.

4.4.42 With regards to the area to which surface water run off could drain, the airport is set within an urban landscape to the north and a largely agricultural landscape to the south, comprising of primarily pasture. To the north lies Luton, with the area adjacent to LLA being predominantly residential in nature. LLA is within the Lee Upper drainage catchment, which has a total of 23 rivers or canals within it. No surface water bodies are present on-site.

4.4.43 The Environment Agency Flood Map for Planning¹⁸ identifies LLA to be located within Flood Zone 1, so has a low probability of flooding. The River Lea, one of the tributaries to the River Thames, is located approximately 0.5 km to the south-west of LLA; land on either side of the River is designated as Flood Zone 3 (so at a high probability of flooding).

4.4.44 Since there are no material changes proposed that seek to alter the overall quantum of built development or increase impermeable areas, it is not expected that there will be any additional significant effects requiring further assessment in relation to water resources and flood risk.

4.4.45 A Drainage and Water Supply Infrastructure Appraisal has been carried out and submitted with the Planning Application. This appraisal evaluates the ability of the existing drainage and water supply systems to accommodate the additional passengers arising from the Proposed Scheme. This has evaluated the existing surrounding public infrastructure conveying contaminated surface and foul water, and incoming water supply.

4.4.46 There will be an increase in demand for water from the network due to the additional 1 mppa associated with the Condition 8 variation. However, as the airport plans to restrict peak passenger throughput to those currently experienced under the 2014 Planning Permission at 18 mppa (see **Section 3.3, Graphic 3.1**), neither foul water discharge nor potable water demand will be subject to an increase at peak times. This demand can be met by the local water supplier (Affinity Water).

¹⁸ The Environmental Agency Flood Map for Planning [online]. Available at: <https://flood-map-for-planning.service.gov.uk/>

- 4.4.47 There will be no increase in the peak foul water rate, as peak passenger throughput will be limited to that currently experienced under the 2014 Planning Permission. Although there will be an increase of foul effluent discharge annually, Thames Water has confirmed that this increase in volume can be accommodated within the local network.
- 4.4.48 An increase in surface water contamination from de-icer use will be minimal. This is because of improved operational application techniques and most of the additional aircraft movements coming during non-winter months when the application of de-icer is not required.
- 4.4.49 The Proposed Scheme will not result in any likely significant effects and the local network is able to handle the additional capacity due to the increase in passengers. Due to this, the **water environment topic has been scoped out from further assessment.**

4.5 Consultation

- 4.5.1 As part of the Proposed Scheme, consultation, in the form of meetings, telephone and written correspondence, was undertaken with LBC and its technical advisors to agree the assessment methodologies for technical studies and identify any associated sensitivities or concerns. These are discussed in further in each technical chapter within this ES.
- 4.5.2 A non-statutory public consultation exercise was also undertaken to gather views from the local community, statutory consultees, the wider public, and those with an interest in the Proposed Scheme. Views were specifically sought on:
- plans for increasing the airport's capacity;
 - managing the effects of the proposals on the environment and local communities;
 - opportunities to enhance the local area through the proposals;
 - whether the proposals would help to support regional prosperity and economic growth; and
 - the documents published as part of the consultation.
- 4.5.3 A Consultation Summary Report (CSR) has been prepared that presents the results of the non-statutory consultation held by the Applicant on its proposals and accompanies the Section 73 Application for the Proposed Scheme. This CSR provides details of the consultation undertaken, the number of responses that were received during the consultation period and a summary of the comments received, which are grouped by topic. **Table 4.1** provides an overview of environmental issues that were raised during the consultation, identifies how the EIA has had regard to those issues, and where further information can be found in this ES.

Table 4.1 Overview of environmental issues raised during non- statutory consultation

Issue raised	Consultee	Response and how considered in this ES
<p>Some consultees said that they wanted more information on the following environmental issues:</p> <ul style="list-style-type: none"> • air quality and air quality breaches; • the impacts of the proposals, including environmental, health and climate change impacts; • how impacts, such as noise, air pollution and other environmental impacts will be managed and mitigated; 	Various	<p>Chapter 6: Air quality presents the air quality assessment that has assessed the likely significant effects arising from the proposed change to increase the passenger throughput cap from 18 mppa to 19 mppa. The scope of this assessment was agreed with LBC. It is the operational changes arising from this passenger uplift that would generate additional surface access</p>

Issue raised	Consultee	Response and how considered in this ES
<ul style="list-style-type: none"> the number of additional aircraft movements required to accommodate the increase in passenger numbers; how the proposal would support the local economy; how the existing transport infrastructure would cope with increased passengers; how the daytime and night-time noise contours will be reduced once the temporary variation of Condition 10 has ended. 		<p>movements and atmospheric emissions from a variety of transport modes.</p> <p>Chapter 7: Climate assesses the impact of the increase in Greenhouse Gas (GHG) emissions from the Proposed Scheme on the global climate. It identifies the extent to which the magnitude of emissions associated with the 19 mppa airport, compared to the existing 18 mppa airport affects the ability to meet national budgets and targets for climate change.</p> <p>Chapter 8: Noise presents the noise assessment that has assessed likely significant impacts arising from the Proposed Scheme. It presents the likely significant effects arising from the proposed increases to the daytime and night-time noise contours through the variation of Condition 10 for the period to the end of 2027, and from 2028 onwards.</p> <p>Chapter 9: Health has assessed the likely significant effects arising from the proposed change to raise the passenger throughput cap to 19 mppa, and the resulting changes in air transport movements and surface access movements. The assessment also identifies the likely significant effects of the proposed increase of the noise contours through the variation of Condition 10 for the period to the end of 2027, and from 2028 onwards.</p> <p>Chapter 10: Transport has assessed the likely significant effects arising from the proposed increase of the passenger throughput cap to 19 mppa. It is the operational changes arising from this condition that generate the additional surface access movements from a variety of transport modes. It also demonstrates how the existing transport infrastructure would be able to deal with the additional passenger numbers. Additional information is presented in both the Travel Plan, and Transport Assessment which accompany the Section 73 Application.</p> <p>Table 3.3, Table 3.4, and Appendix 3A present comparative tables that show information regarding the number and types of additional aircraft movements required to accommodate the increase in passenger numbers to 19 mppa. The forecasts presented in these tables have</p>

Issue raised	Consultee	Response and how considered in this ES
Comments were raised by respondents regarding the information provided on aircraft movements. Specifically, comments said that the data did not allow a direct comparison between actual movements in 2018 and 2019.	Various	been used to underpin the assessments carried out and presented within this ES and are based on the current fleet modernisation and renewal strategies of the airlines that operate out of LLA.
		Table 3.3, Table 3.4, and Appendix 3A present comparative tables that show information regarding the number and types of additional aircraft movements required to accommodate the increase in passenger numbers to 19 mppa. The forecasts presented in these tables have been used to underpin the assessments carried out and presented within this ES and are based on the current fleet modernisation and renewal strategies of the airlines that operate out of LLA.

4.6 Overview of assessment methodology

Introduction

- 4.6.1 All the topic assessments presented in the ES have been undertaken on the basis of a description of the Proposed Scheme provided in **Chapter 3: Description of the Proposed Scheme**.
- 4.6.2 For each topic, the assessment of likely significant effects has been undertaken by competent experts with relevant specialist skills, drawing on their experience of working on other development projects, good practice in EIA and on relevant published information (**Appendix 1D** and **Appendix 1E** in **Volume 3: Figures and Appendices**). For both **Chapter 9: Noise** and **Chapter 10: Transport** use has been made of modelling.
- 4.6.3 With few exceptions, each topic chapter follows a common format, as outlined below:
1. Introduction;
 2. Limitations of this assessment;
 3. Legislative and policy context;
 4. Data gathering methodology;
 5. Overall baseline;
 6. Consultation;
 7. Scope of the assessment;
 8. Environmental measures embedded into the scheme;
 9. Assessment methodology;
 10. Assessment of effects - this sub-section excludes cumulative effects and deals separately with each receptor or category of receptors that could be significantly affected. The assessment is made against the predicted future baseline (see **Section 4.7**);

11. Consideration of optional additional mitigation or compensation;
12. Conclusion of significance evaluation; and
13. Implementation of environmental measures.

4.7 Identification of baseline conditions

- 4.7.1 To determine the baseline conditions that should be used for the assessment of the likely significant effects of the Proposed Scheme, it is necessary to define the current baseline conditions and then to decide whether these conditions are likely to change by the 'assessment years' that are selected for the operation of the proposed variations to Conditions 8 and Condition 10.
- 4.7.2 If this future baseline is more likely to occur than the current baseline, the future baseline is used for the assessment of likely significant effects. However, in many cases it may conclude that the current baseline is just as likely, or even more likely, to occur in the assessment years than would be the case with any future baseline conditions. When this is the case, the current baseline is used for the assessment.
- 4.7.3 Generally, in EIA the current baseline is determined for the 'Study Area' of each environmental topic by a combination of desk-based research, consultation with the relevant statutory and non-statutory authorities, and where, required, field survey work.
- 4.7.4 In this instance, the Proposed Scheme does not relate to a physical structure however, noise contours associated with the variations proposed mean the Study Area assessed as part of the 2014 Planning Permission 2012 ES did not include the additional land now included within the noise contours for the proposed Condition 10 variation.
- 4.7.5 Details of the Study Area are discussed in the baseline section of each environmental topic chapter. These chapters also explain the basis for defining the baseline conditions.
- 4.7.6 Part of understanding baseline conditions involves identifying nearby developments (and other land use / environmental changes) that need to be considered within the EIA due to the likelihood that those developments would contribute to cumulative effects associated with construction phases occurring at the same time or introducing new receptors to the Study Area during the relevant baseline year. If cumulative schemes are unlikely to occur at the same timescales, they should not be referred to. Further guidance on cumulative effects is provided in **Section 4.8**).

4.8 Overview of approach to evaluation of significance

Introduction

- 4.8.1 A requirement of an ES is to set out the conclusions that have been reached about whether the Proposed Scheme would result in any additional likely significant environmental effects or increases in significance to those identified within the 2014 Planning Permission 2012 ES. Reaching a conclusion about which effects, if any, are likely to be significant is the culmination of an iterative process that involves the following stages:
- identifying those effects that could be likely to be significant (see **Section 4.4** on scoping);
 - assessing the effects of the Proposed Scheme against the baseline (current or future, as appropriate); and
 - concluding whether these resultant effects are likely to be significant.

- 4.8.2 **Chapters 6 to 10** describe the approaches that have been used, in relation to the stages outlined in the bullet points above, for each of the environmental topics that are considered in this ES.

Identification of likely significant effects

- 4.8.3 To inform the identification of likely significant effects, during the early stages of the assessment process, information pertaining to current and future operation at LLA was considered. This enabled the assessment of potential environmental changes caused by the Proposed Scheme to be refined, including their spatial extent and characteristics (e.g. their magnitude, frequency, duration etc.).
- 4.8.4 The identification of receptors under consideration within the assessments draws upon available information about environmental change. The technical assessments, undertaken in **Chapters 6 - 10**, describe how environmental changes and resulting effects are assessed, together with the topic specific approaches that have been used to identify the receptors affected by the Proposed Scheme.

Types of effects

- 4.8.5 Paragraph 5 of Schedule 4 of the 2017 EIA Regulations¹⁹ states:
- "The description of the likely significant effects on the factors specified in regulation 4(2) should cover the direct effects and any indirect, secondary, cumulative, transboundary, short-term, medium-term and long-term, permanent and temporary, positive and negative effects of the development."*
- 4.8.6 This ES considers all these types of effects where they are relevant to different environmental topic chapters, with the exception of cumulative effects, which are dealt with separately in **Section 4.9**.

Direct effects

- 4.8.7 Direct effects are those that result directly from a scheme. For example, where a machine disturbs an area of habitat; the associated physical activity could result in a change to the receptor (i.e. the habitat).

Indirect and secondary effects

- 4.8.8 Indirect and secondary effects are those that result from consequential change caused by the scheme. As such they would normally occur later in time or at locations farther away than direct effects. An example would be where water or gas pipes are damaged as a result of the development, and the consequences of that damage is fire or flood risk to other receptors.

Transboundary effects

- 4.8.9 Transboundary effects are those that would affect the environment in another state within the European Economic Area (EEA). Unless these effects are considered significant, they are not reported within the topic chapters (**Chapters 6 - 10**) of this ES. Following EIA guidance, transboundary effects related to climate have been assessed within **Chapter 7: Climate**.

¹⁹ The Town and Country Planning (Environmental Impact Assessment) Regulations 2017, Schedule 4, Paragraph 5 [online]. Available at: <http://www.legislation.gov.uk/uksi/2017/571/contents/made> [Checked November 2020].

Temporal effects

- 4.8.10 As discussed in **Section 4.3**, temporal effects are typically defined as being permanent or temporary as follows:
- **Permanent** - these are effects that will remain even when the scheme is complete, although these effects may be caused by environmental changes that are permanent or temporary. For example, an excavator that is temporarily driven over an area of valuable habitat could cause so much damage that the effect on this vegetation would be permanent; or
 - **Temporary** – these are effects that are related to environmental changes associated with a particular activity and that will cease when that activity finishes.

Significance evaluation

Overview

- 4.8.11 The receptors that could be significantly affected are identified within each topic chapter. The approach that is adopted to determine whether the effects on these receptors are significant is to apply a combination of professional judgement and a topic-specific significance evaluation methodology that draws on the results of the assessment work that has been carried out.
- 4.8.12 Receptors that are likely to be significantly affected as a result of the Proposed Scheme are identified in the topic chapters (**Chapters 6 - 10**). The adopted approach to determine whether effects on receptors is significant is to apply a combination of professional judgement and significance evaluation methodology which is topic-specific to draw upon the results of the assessment.
- 4.8.13 In applying this approach to significance evaluation, it is necessary to ensure that there is consistency between each environmental topic in the level at which effects are considered to be significant. Therefore, it is inappropriate for the assessment of one topic to conclude that minor effects are significant, when, for another topic, only comparatively major effects are significant.
- 4.8.14 In order to achieve the desired level of consistency, each environmental topic lead has been guided in their decision-making about likely significance by the '*significance test*' that informed the preparation of the scoping report (see **Section 4.4** above), as well as the relevant topic-specific significance evaluation methodology.
- 4.8.15 Conclusions about significance are arrived at using the following: professional judgement; available information on the magnitude and other characteristics of potential changes expected to be caused by the Proposed Scheme; receptors' sensitivity to these changes; the value of the receptor; and the effects of these changes on relevant receptors.
- 4.8.16 In some cases, use of the '*significance test*' alone will enable a conclusion to be reached in the 'Scope of the assessment' section of the topic chapter (Sub-section 6 in paragraph 4.6.3), without the need for more detailed assessment, that a potential effect is not likely to be significant. However, in other cases, effects identified in the 'Scope of the assessment' section are taken forward for further assessment in the subsequent section(s) of each topic chapter.
- 4.8.17 For some of these effects, relatively little assessment work may be required to reach a conclusion that an effect is not significant. But, in other cases, more extensive assessment work is required. Sometimes the application of the '*significance test*' is sufficient to support this conclusion but, in other cases, the relevant topic-specific significance evaluation methodology is used to inform the evaluation of significance (to determine whether an effect is or is not significant).

- 4.8.18 Having applied the relevant topic-specific significance evaluation methodology, the topic specialists check the conclusions against the significance test. If this test results in a different conclusion to that reached using the significance evaluation methodology, a detailed justification is provided as to why this different conclusion is valid.
- 4.8.19 For some of the topics that are assessed in the ES, there is published guidance available about significance evaluation. Where such guidance exists, even if in draft, it has been used to inform the development of the significance evaluation methodologies that are used in this ES. For other topics, it has been necessary to develop methodologies without the benefit of guidance. This has involved technical specialists drawing on their previous experience of significance evaluation in EIA.

Evaluation matrices

- 4.8.20 Significance evaluation involves combining information about the sensitivity, importance or value of a receptor, and the magnitude and other characteristics of the changes that affect the receptor. The approach to using this information for significance evaluation is outlined below.

Receptor sensitivity and importance/value

- 4.8.21 The value of a receptor is largely a product of the importance of an asset, as informed by legislation and policy, and as qualified by professional judgement. For example, receptors for landscape, biodiversity or the historic environment may be defined as being of international or national importance. Lower value resources may be defined as being important at a county or district level. For each environmental topic, it is necessary to provide a detailed rationale that explains how the categories of importance or value have been used. The sensitivity of a receptor will be dependent on its ability to respond to change and the nature and duration of the change.
- 4.8.22 The use of a location or physical element that may be representative of receptors, e.g. human beings, would also play a part in its classification in terms of sensitivity and importance/value. For example, when considering effects on the amenity of a human population, a location used for recreational purposes may be valued more than a place of work and may be considered more sensitive to changes brought about by the Proposed Scheme.

Magnitude of change

- 4.8.23 The magnitude of change affecting a receptor that would be affected by the Proposed Scheme would be identified on a scale from very low to very high. As with receptor sensitivity and importance/value, a rationale is provided in each topic chapter (**Chapters 6 - 10**) that explains how the categories of environmental change are defined. For certain topics, the magnitude of change would be related to guidance on what levels of change are acceptable (e.g. for air quality or noise) and be based on numerical parameters. For other changes, it will be a matter of professional judgement to determine the magnitude of change, using descriptive terms.

Determination of significance

- 4.8.24 The significance of an effect is determined with reference to information about the nature of the Site and the Proposed Scheme, the receptors that could be significantly affected and their sensitivity and importance/value, together with the magnitude of environmental changes that are likely to occur. The effects of the environmental changes are considered with respect to their duration, frequency, timing, and reversibility.
- 4.8.25 Sensitivity or value and the characteristics of environmental changes can be combined using a matrix (see **Table 4.3**). In addition, professional judgement is applied because, for certain

environmental topics, the lines between the sensitivities or magnitudes of change may not be clearly defined and the resulting assessment conclusions may need clarifying.

- 4.8.26 Variations to this approach will be detailed in the relevant 'Significance evaluation methodology' sub-section contained in each environmental topic chapter (**Chapters 6 - 10**).
- 4.8.27 Definitions of how matrix categories are derived for each topic are also outlined in the relevant environmental topic chapter (**Chapters 6 - 10**), along with an explanation of receptor sensitivity, magnitude of change and levels of effect that are considered significant under the 2017 EIA Regulations.
- 4.8.28 Within the matrix that is used in most significance evaluation exercises reference is made to:
- **Major effects**, which will always be determined as being significant in EIA terms;
 - **Moderate effects**, are likely to be significant, although there may be circumstances where such effects are considered not significant on the basis of professional judgement; and
 - **Minor or negligible effects**, which will always be determined as not significant.

Table 4.3 Significance evaluation matrix

		Magnitude of change				
		Very high	High	Medium	Low	Very low
Sensitivity/importance/value	Very high	Major (Significant)	Major (Significant)	Major (Significant)	Major (Significant)	Moderate (Potentially significant)
	High	Major (Significant)	Major (Significant)	Major (Significant)	Moderate (Potentially significant)	Minor (Not significant)
	Medium	Major (Significant)	Major (Significant)	Moderate (Potentially significant)	Minor (Not significant)	Negligible (Not significant)
	Low	Major (Significant)	Moderate (Potentially significant)	Minor (Not significant)	Negligible (Not significant)	Negligible (Not significant)
	Very low	Moderate (Potentially significant)	Minor (Not significant)	Negligible (Not significant)	Negligible (Not significant)	Negligible (Not significant)

Note: Significant effects are those identified as 'Major'. 'Moderate' effects would normally be deemed to be significant. However, there may be some exceptions, depending on the environmental topic and the application of professional judgment.

4.9 Assessment of cumulative effects

Introduction

- 4.9.1 There is a requirement under the 2017 EIA Regulations to consider the cumulative effects of the Proposed Scheme. This element of the assessment has identified whether any of the individual effects of the Proposed Scheme would combine to create a cumulative effect greater than the sum of the individual effects.

4.9.2 The cumulative effects assessment considered this in two ways:

- **Inter-project effects:** consideration has been given to whether there is the potential for the effects of the Proposed Scheme and effects of other 'major' developments to combine and result in a significant environmental effect; and
- **Intra-project effects:** typically, these effects occur when different activities associated with the Proposed Scheme act upon the same environmental receptor. In determining such effects, consideration has been given to the sensitivity of the receptor and the magnitude of environmental change. Consideration is given to both the interaction of significant effects and the interaction of different impacts from project activities even if individually they are not significant.

4.9.3 The proposed variation to Condition 8 and Condition 10 intends to change the noise environment and the passenger throughput cap. Consideration has therefore been given to the potential inter-project and intra-project effects that could arise from a change in the noise environment, and where the increased passenger throughput could have subsequent air quality, climate, noise, health, and transport effects. All other cumulative effects as assessed within 2012 ES remain valid, since there are no further material changes as a result of the Amendments that would alter the assessment previously undertaken.

Inter-project effects

4.9.4 Typically, for each environmental topic that is dealt with in this ES Addendum, an assessment is undertaken of how the environmental effects resulting from the Proposed Scheme, could combine with the same topic-related effects generated by other developments to affect a common receptor. To do this, it is important to first identify which other developments need to be included in the cumulative effects assessment under each environmental topic assessment.

4.9.5 The approach taken within this ES Addendum differs to that taken within the 2014 Planning Permission 2012 ES, however for robustness this ES has used the methodology set out in the Planning Inspectorate Advice Note Seventeen: Cumulative effects assessment²⁰ relevant to nationally significant infrastructure projects. This methodology involves first acknowledging that the availability of information necessary to conduct a cumulative effects assessment will partly depend on the prevailing status of the relevant other developments within the Study Area. This process then develops this concept further by grouping the other developments into tiers, which reflect the likely degree of certainty attached to each development, with Tier 1 being the most certain and Tier 3 the least certain (see **Table 4.4**). This is illustrated in **Table 4.4**, which is a slightly modified version of Table 3 in the advice note to reflect that it is being applied to a *Town and Country Planning Act 1990* application.

²⁰ The Planning Inspectorate, Cumulative Effects Assessment Advice Note Seventeen: Cumulative effects assessment relevant to nationally significant infrastructure projects, August 2019 [online]. Available at: <https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/2015/12/Advice-note-17V4.pdf> [Checked November 2020].

Table 4.4 Other developments to be considered in the Cumulative Effects Assessment

Hierarchy of other developments	Certainty of other developments	
Tier 1	Under construction*.	
	Permitted application(s), whether under the <i>Planning Act 2008</i> or other regimes, but not yet implemented.	
	Submitted application(s), whether under the <i>Planning Act 2008</i> or other regimes, but not yet determined.	
Tier 2	Projects which have been received by a relevant local planning authority, and where a scoping report has been submitted.	
Tier 3	Projects which have been the subject of pre-application discussion with a relevant LPA, where a scoping report has not been submitted.	
	Identified in the relevant Development Plan (and emerging Development Plans - with appropriate weight being given as they move closer to adoption) recognising that much information on any relevant proposals will be limited.	
	Identified in other plans and programmes (as appropriate) which set the framework for future development consents/approvals, where such development is reasonably likely to come forward.	

Decreasing
level of detail
likely to be
available

Source: Adapted from the Planning Inspectorate Advice Note Seventeen²¹

* Where other projects are expected to be completed before construction of a scheme, and the effects of those projects are fully determined, effects arising from them are considered as part of the baseline and therefore as part of the assessment of both the construction and operational phases. This ES will therefore clearly distinguish between projects forming part of the baseline and those in the cumulative effects assessment

- 4.9.6 Cumulative effects have been assessed where there are additional developments located within the noise contour limits, which have been granted consent between the baseline assessment year assessed within the 2012 ES (i.e. 2011) and 2020. Additionally, the assessment has taken account of the growth in traffic on the highway network that could arise from other developments.
- 4.9.7 A search of the planning portal confirmed that a total of 6,571 dwellings have been given consent within the noise contours limit since 2011. Assuming an average occupancy of 2.7 persons per house, based on census data for the area, this indicates that approximately 17,742 additional residents now live within the study area for the proposed variation to Condition 10.
- 4.9.8 These include: Land adjacent to Caddington Road, Land Adjacent to Caddington Road and Newlands Road, 13 – 31 Dunstable Road, Land at Cotswold Farm Business Park, Former Travis Perkins Site Dallow Road, 1 – 11 Cumberland Street, amongst other single dwelling schemes.
- 4.9.9 The assessments for noise and health have calculated the population growth in the area for the purposes of noise modelling. This has identified a population increase since 2011 (the baseline assessment year) that has been attributed to each noise contour. This population growth calculation has assumed a higher population growth than identified above and as such, the assessment of cumulative schemes has been based on the population growth calculation rather than the 2014 Planning Permission and planning permissions granted since the 2012 ES. **No likely significant inter-project effects** are predicted to occur from the Proposed Scheme together with 'other developments'.

²¹ The Planning Inspectorate, Cumulative Effects Assessment Advice Note Seventeen: Cumulative effects assessment relevant to nationally significant infrastructure projects, August 2019 [online]. Available at: <https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/2015/12/Advice-note-17V4.pdf> [Checked November 2020].

Intra-project effects

- 4.9.10 The second type of cumulative effects assessment involves assessing whether any of the individual environmental topic effects resulting from the proposed variation to Condition 8 and Condition 10, which are not significant in their own right, could combine to create effects that are significant.
- 4.9.11 Typically, the first step is to identify the environmental topics that have common receptors, and then to consider whether the topic effects on any common receptors are likely to combine. The most likely types of receptors that could fall into this category are those pertaining to the amenity of the relevant human population. For example, the occupants of a residential property in close proximity to the Proposed Scheme might be subject to adverse effects in terms of noise, vibration, air quality, traffic, as well as with regard to visual amenity, or any combination thereof, each of which, when assessed individually, is not significant in EIA terms, but when assessed cumulatively, the effects are judged to be significant.
- 4.9.12 The potential for inter-related effects has been identified at receptors that could experience noise and health effects, and these are reported in **Chapter 8: Health** and **Chapter 9: Noise**. The air quality, climate, and transport assessments have identified that no likely significant effects would occur. There are, therefore, unlikely to be any likely significant intra-project effects involving interactions with these aspects. Additionally, all other effects as assessed within the 2014 Planning Permission 2012 ES remain valid since there are no material changes to the application that would impact upon the previous assessment undertaken. **No likely significant intra-project effects** are predicted to occur from the Proposed Scheme.

Summary

- 4.9.13 The approach adopted to addressing the potential for likely significant cumulative effects is a proportionate one. The assessments presented in **Chapter 6 to Chapter 10** show that the proposed changes to the operation of the airport are unlikely to result in likely significant effects of a magnitude which could interact with other projects and result in likely significant cumulative effects.
- 4.9.14 The assessment of the potential traffic impacts on the local highway network (**Chapter 10: Transport**), and discussions held with Highways England and Luton Borough Council, have established that the level of flow increase is unlikely to have a significant impact on the operation of the network. As such, further detailed transport modelling analysis would not be warranted at this stage. Additionally, the air quality impact assessment presented in **Chapter 6: Air quality**, shows that the impacts arising from the change in road traffic movements, and from the uplift to 19 mppa, shows that there would be negligible effects on air quality. The assessments of noise (**Chapter 9: Noise**) and health (**Chapter 8: Health**) have also accounted for additional developments since 2011, which have introduced new dwellings, and included them as new receptors.

5. Legislative and policy overview

- 5.1.1 This chapter provides an overview of the relevant national, regional, and strategic local planning policies to establish the policy context against which the proposed variation to Conditions 8 and 10 will need to be considered. Further topic specific policies that have been considered are provided in the environmental topic chapters (**Chapters 6 - 10**) within this ES.

5.2 Legislative context

EIA directive 2014/52/EU²²

- 5.2.1 The legal basis for EIA is derived from European Community (EC) Directive 85/337/EEC²³, then further amended by Directives 97/11/EC²⁴ and 2003/35/EC²⁵ with the amended directive being consolidated as Directive 2011/92/EU²⁶. Subsequent to this, Directive 2011/92/EU²⁶ has been substantially amended by Directive 2014/52/EU²⁷.

Town and Country Planning (Environmental Impact Assessment) Regulations 2017

- 5.2.2 On 16th May 2017, the 2017 EIA Regulations²⁸ came into force in England to incorporate the requirements of the 2014 Directive into domestic legislation. These regulations apply to development which is given planning permission under Part III of the Act 1990²⁹. The 2017 EIA Regulations revoked the Town and Country Planning (EIA) Regulations 2011³⁰.

5.3 National planning policy context

National Planning Policy Framework

- 5.3.1 In February 2019, the Ministry of Housing, Communities and Local Government (MHCLG) published a revised National Planning Policy Framework³¹ (NPPF), which sets out the Government's planning

²² Environmental Impact Assessment Directive 2014/52/EU, [online]. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32014L0052> [Accessed 18 December 2020].

²³ Council Directive 85/337/EEC of 27 June 1985 on the assessment of the effects of certain public and private projects on the environment.

²⁴ Council Directive 97/11/EC of 3 March 1997 amending Directive 85/337/EEC on the assessment of the effects of certain public and private projects on the environment.

²⁵ Directive 2003/35/EC of the European Parliament and of the Council of 26 May 2003 providing for public participation in respect of the drawing up of certain plans and programmes relating to the environment and amending with regard to public participation and access to justice Council Directives 85/337/EEC and 96/61/E.

²⁶ Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment (codification).

²⁷ Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment.

²⁸ The Town and Country Planning Act 1990 [online]. Available at: <https://www.legislation.gov.uk/ukpga/1990/8/contents> [Accessed 18 December 2020].

²⁹ Town and Country Planning (Environmental Impact Assessment) Regulations 2017 [online]. Available at: http://www.legislation.gov.uk/uksi/2017/571/pdfs/uksi_20170571_en.pdf [Accessed 18 December 2020].

³⁰ Town and Country Planning (Environmental Impact Assessment) Regulations 2011 [online]. Available at: <https://www.legislation.gov.uk/uksi/2011/1824/contents/made> [Accessed 18 December 2020].

³¹ Ministry of Housing, Communities & Local Government (2019). National Planning Policy Framework, [online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/779764/NPPF_Feb_2019_web.pdf [Accessed 23 November 2020].

policies for England and is a material consideration in determining planning applications. The revised Framework replaces the previous NPPF³¹ published in March 2012 and in July 2018.

- 5.3.2 At the heart of the revised NPPF³¹ is a presumption in favour of sustainable development through plan-making and decision-taking. Paragraph 11 sets out that this is taken to mean:

"approving development proposals that accord with an up-to-date development plan without delay; or

where there are no relevant development plan policies, or the policies which are most important for determining the application are out-of-date, granting permission unless:

i. the application of policies in this Framework that protect areas or assets of particular importance provides a clear reason for refusing the development proposed; or

ii. any adverse impacts of doing so would significantly and demonstrably outweigh the benefits, when assessed against the policies in this Framework taken as a whole."

- 5.3.3 Section 9 (Paragraph 104) of the revised NPPF³¹, "Promoting Sustainable Transport", refers to large scale transport facilities and states that planning policies should:

"...provide for any large scale transport facilities that need to be located in the area, and the infrastructure and wider development required to support their operation, expansion and contribution to the wider economy. In doing so they should take into account whether such development is likely to be a nationally significant infrastructure project and any relevant national policy statements..."

- 5.3.4 Furthermore, Paragraph 104 presents a strengthened policy position in respect of aviation and states that planning policies should:

"recognise the importance of maintaining a national network of general aviation airfields, and their need to adapt and change over time – taking into account their economic value in serving business, leisure, training and emergency service needs, and the Government's General Aviation Strategy".

- 5.3.5 The revised NPPF³¹ includes a range of other policies that are potentially relevant to the proposed variation to Conditions 8 and 10. These policies relate to (inter alia): health, air quality, climate change, and noise. Where appropriate, these policies are referred to in the topic chapters of this ES (**Chapters 6 - 10**) and are therefore not repeated here.

National Planning Practice Guidance

- 1.1.1 On 6 March 2014, the Department for Communities and Local Government (DCGL), now known as the Ministry of Housing, Communities and Local Government (MHCLG), launched the National Planning Practice Guidance³² (NPPG), a web-based resource. Together with the NPPF³¹, this sets out the Government's overall planning policy framework. With specific regard to aviation and airport planning, the NPPG does not introduce any additional guidance beyond that which is already captured by the NPPF.
- 1.1.2 Where relevant, Noise Action Plans, and, in particular the Important Areas identified through the process associated with the Environmental Noise Directive and corresponding regulations should be taken into account (Paragraph: 006). The latest Noise Action Plan for 2019 – 2023³³ was

³² Ministry of Housing, Communities & Local Government (2014). Planning Practice Guidance, [online]. Available at: <https://www.gov.uk/government/collections/planning-practice-guidance> [Accessed 18 December 2020].

³³ London Luton Airport. Noise Action Plan 2019 – 2023 [online]. Available at: <https://www.london-luton.co.uk/corporate/community/noise/noise-action-plan> [Accessed November 2020].

approved by Central Government. The Noise Action Plan is explained further within the relevant technical chapters of the ES.

5.4 Aviation Planning Policy

Aviation Policy Framework

- 5.4.1 The Aviation Policy Framework³⁴ (APF) was published in March 2013 and fully replaces the 2003 Air Transport White Paper³⁵ as Government policy on aviation. The framework outlines objectives and principles to guide plans and decisions on airport developments, bringing together many related and discreet policies. By defining the Government's objectives and policies on the impacts of aviation, the APF sets out the framework within which decisions on aviation ought to be made to deliver a balanced approach to securing the benefits of aviation and to support economic growth.
- 5.4.2 The APF states that the *"Government wants to see the best use of existing airport capacity"* and that in the short-term, a key priority for Government is to continue to work with the aviation industry and other stakeholders to make better use of existing runways at all UK airports to improve performance, resilience, and the passenger experience.
- 5.4.3 The APF presents the government's objective to *"ensure that the aviation sector makes a significant and cost-effective contribution towards reducing global emissions"*. This document postpones deciding on whether the UK should retain a national emissions target for aviation. It also sets out the need to better understand and manage the risks associated with climate change. This was deemed essential for the successful long-term resilience of the UK's aviation industry and its contribution to supporting economic growth and competitiveness.
- 5.4.4 Section 5 (planning) sets out that all proposals for airport development must be accompanied by clear surface access proposals which demonstrate how the airport will ensure easy and reliable access for passengers, increase the use of public transport by passengers to access the airport, and minimise congestion and other local impacts.
- 5.4.5 The APF set out the need for a national policy statement (NPS) for the case of any new national hub airport capacity, the Aviation NPS (ANPS) was published in June 2018. While on 27 February 2020 the Court of Appeal ruled that the ANPS was not validly produced, the Supreme Court overturned this decision in December 2020 and the ANPS remains in force.

Aviation 2050: The Future of UK Aviation

- 5.4.6 The APF provided policy support for airports outside the South East of England to make best use of their existing airport capacity whilst the future of airports within South East England were considered by the Airports Commission. The Airports Commission concluded that an additional runway in South East England would be needed by 2030 but also noted that there would be a need for other airports to make more intensive use of their existing infrastructure. The Government agreed to support an additional runway at Heathrow through an ANPS and also published the *Beyond the Horizon: The Future of UK Aviation*³⁶ in 2018 to provide policy support for all airports

³⁴ Department for Transport (2013). Aviation Policy Framework, [online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/153776/aviation-policy-framework.pdf [Accessed 18 December 2020].

³⁵ Department for Transport (2003). The Future of Air Transport, [online]. Available at: <https://www.gov.uk/government/publications/the-future-of-air-transport> [Accessed 18 December 2020].

³⁶ Department for Transport (2018). Beyond the horizon – The future of UK aviation, [online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/698247/next-steps-towards-an-aviation-strategy.pdf [Accessed 18 December 2020].

who wish to make best use of their existing runways, including those in South East England, subject to environmental issues being addressed.

- 5.4.7 In essence, the *Beyond the Horizon: The Future of UK Aviation* established the Government's support for the Making Best Use (MBU) policy for all airports in the UK. It has also forecasted an accelerated growth in passenger demand in the London area at Heathrow, Gatwick, Stansted, Luton, and City. As such, the MBU policy is particularly encouraged at all London airports and Heathrow is envisaged by the Government to develop an additional runway on top of the MBU policy.
- 5.4.8 *The Beyond the Horizon: The Future of UK Aviation* nevertheless acknowledges that the MBU policy can have negative as well as positive local impacts, including on noise levels. The Government therefore considers that any proposals for MBU should be judged by the relevant planning authority, taking careful account of all relevant considerations, particularly economic and environmental impacts, and proposed mitigations (Paragraph 1.29).

Airports National Policy Statement

- 5.4.9 The *Airports National Policy Statement* (NPS)³⁷ was published in June 2018. This followed approval from the House, after which it was designated as a national policy statement under the provisions of Section 5 (1) of the Planning Act 2008 subject to any legal challenge.
- 5.4.10 The NPS provides the primary basis for decision making on development consent order (DCO) applications for nationally significant aviation-related development and, specifically, a north-west runway at Heathrow Airport. Whilst the Proposed Scheme is not of a scale considered to be nationally significant, it is important to consider the proposals in the context of this national policy on aviation.
- 5.4.11 Specifically, in paragraph 1.39, the Government confirms that it is supportive of airports beyond Heathrow making best use of their existing runways albeit that they recognise that the development of airports can have positive and negative impacts, including on noise levels. Consistent with paragraph 1.29 of *Beyond the horizon: the future of UK aviation*, "Making best use of existing runways", the Government states that any proposals should be judged on their individual merits by the relevant planning authority, taking careful account of all relevant considerations, particularly economic and environmental impacts.
- 5.4.12 As indicated in paragraph 1.39, paragraph 1.42 states that airports wishing to make more intensive use of existing runways will still need to submit an application for planning permission or development consent to the relevant authority, which should be judged on the application's individual merits. However, in light of the Airports Commission's findings on the need for more intensive use of existing infrastructure as described at paragraph 1.6 of the *Airports NPS*³⁷, the Government accepts that it may well be possible for existing airports to demonstrate sufficient need for their proposals, additional to (or different from) the need which is met by the provision of a north-west runway at Heathrow Airport.
- 5.4.13 The Airport Commission's Final Report³⁸ recognised the need for an additional runway in the South East by 2030, but it also noted that there would be a need for other airports to make more intensive use of their existing infrastructure.

³⁷ Department for Transport (2018). Airports national policy statement: new runway capacity and infrastructure at airports in the south-east of England, [online]. Available at:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/714106/airports-nps-new-runway-capacity-and-infrastructure-at-airports-in-the-south-east-of-england-web-version.pdf [Accessed 12 December 2020].

³⁸ The Airports Commission: Airports Commission: Final Report (2015). Available [online] at:

<https://www.gov.uk/government/publications/airports-commission-final-report> [Accessed 23 November 2020].

- 5.4.14 On 24th October 2017, the Department for Transport (DfT) released its latest aviation forecasts. These are the first since 2013. The updated forecasts reflect the accelerated growth experienced in recent years, and that demand was 9% higher in London in 2016 than the Airports Commission Forecast. This has put pressure on existing infrastructure by airports over the past decade, and highlights that the government has a clear issue to address.
- 5.4.15 The Aviation Strategy calls for evidence set out that government agrees with the Airport Commission's recommendation and was minded to be supportive of all airports who wish to make best use of their existing runways, including those in the South East, subject to environmental issues being addressed.
- 5.4.16 The justification of the need for the Proposed Scheme is discussed in the **Planning Statement** and **Chapter 2: Proposed Scheme need and alternatives**. The Government's policy on this issue will continue to be considered in the context of developing a new Aviation Strategy.
- 5.4.17 The consultation document "*The future of UK aviation: making best use of existing runways*"³⁹ sets out that airport expansions under 10 million passengers per annum (mppa) should be considered at a Local Planning Authority level and take into account that the overall approach to reducing aviation GHG emissions from the UK is a matter to be tackled at a national level through the forthcoming Aviation Strategy²¹⁸ which will be considered as part of the Net Zero Aviation Consultation updated in Autumn 2020. The response concludes that the government intends to:
- to take forward new powers for the Secretary of State (delegable to the CAA) to direct that airspace change proposals are taken forward by airports or other relevant bodies;
 - take forward its sanctions and penalties regime proposal; and
 - give the CAA the responsibility for enforcing the sanctions and penalties regime.
- 5.4.18 The response includes an impact assessment on 'Enforcing the development of airspace change proposals'. This is not the final outcome of the *Aviation 2050 – the future of UK aviation* consultation, which will be added to when completed.
- 5.4.19 National Policy Statements can be material planning consideration when considering an application submitted under the Town and Country Planning Act. The ANPS includes national policy guidance across a range of environmental impacts which, whilst focussed upon Heathrow Runway 3, may have some relevance for other airports in the South East.
- 5.4.20 In February 2020, the Court of Appeal ruled that the Government had failed to consider the Paris Agreement in designating the ANPS and this procedural failure was an error of law. The ruling by the Court of Appeal has been challenged at the Supreme Court and overturned, and therefore the ANPS is a valid consideration for aviation projects.

³⁹ HM Government (2018). Beyond the horizon: The future of UK aviation. Making best use of existing runways. [online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/714069/making-best-use-of-existing-runways.pdf [Accessed 21 October 2020].

5.5 Planning policy context

Local planning policy

Luton Local Plan (2011 - 31)

- 5.5.1 The Development Plan consists of the LBC Local Plan 2011 - 2031⁴⁰, adopted in November 2017. Policy LLP6: London Luton Airport Strategic Allocation, states in relation to airport expansion that proposals for development will only be supported where:
- i. they are directly related to airport use of development;*
 - ii. they contribute to achieving national aviation policies;*
 - iii. are in accordance with an up-to-date Airport Master Plan published by the operators of London Luton Airport and adopted by the Borough Council;*
 - 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;*
 - v. achieve further noise reduction or no material increase in day or night time noise or otherwise cause excessive noise including ground noise at any time of the day or night and in accordance with the airport's most recent Airport Noise Action Plan;*
 - vi. include an effective noise control, monitoring and management scheme that ensures that current and future operations at the airport are fully in accordance with the policies of this Plan and any planning permission which has been granted;*
 - vii. include proposals that will, over time, result in a significant diminution and betterment of the effects of aircraft operations on the amenity of local residents, occupiers and users of sensitive premises in the area, through measures to be taken to secure fleet modernisation or otherwise;*
 - viii. incorporate sustainable transportation and surface access measures that, in particular, minimise use of the private car, maximise the use of sustainable transport modes and seek to meet modal shift targets, all in accordance with the London Luton Airport Surface Access Strategy;*
 - ix. incorporate suitable road access for vehicles including any necessary improvements required as a result of the development”.*
- 5.5.2 Policy LLP38: Pollution and Contamination considers the effects of noise associated with new development and states that where adverse impacts are identified, appropriate mitigation will be required. In relation to pollution (including noise) the relevant part of the wider policy states the following:
- “Pollution*
- 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,*

⁴⁰ Luton Borough Council (2017) Luton Local Plan 2011-2031, [online]. Available at: <https://www.luton.gov.uk/Environment/Lists/LutonDocuments/PDF/Local%20Plan/adoption/Luton-Local-Plan-2011-2031-November-2017.pdf> [Accessed 18 December 2020].

biological, and radiological contamination and the effects of noise, vibration, light, heat, fluid leakage, dust, fumes, smoke, gaseous emissions, odour, explosion, litter, and pests.”

London Luton Airport Development Brief

- 5.5.3 The Development Brief was adopted as Supplementary Planning Guidance in September 2001 with the intention to guide decision making for Airport related development. The Brief is considered to be a material planning consideration in the determination of any planning application and that development proposals complying with it will be supported subject to environmental impacts and mitigation.
- 5.5.4 The Development Brief sets out future developments at the Airport including the expansion of the Central Terminal Area, multi storey car parks, potential piers, taxiway extensions and links. The Development Brief supports the principle of the expansion of the Airport through three key objectives:
- to make the airport a better airport;
 - to make the airport a bigger airport; and
 - to be the best neighbour they can be.

6. Air quality

6.1 Introduction

- 6.1.1 This chapter of the ES assesses the likely significant effects of the Proposed Scheme with respect to air quality. The chapter should be read in conjunction with **Chapter 3: Description of the Proposed Scheme** and with respect to relevant parts of other chapters including **Chapter 8: Human health** and **Chapter 10: Transport**, where there is an overlap or relationship. This chapter supplements the air quality chapter in the 2014 Planning Permission.
- 6.1.2 This air quality assessment has assessed the likely significant effects arising from the proposed change to Condition 8, which increases the existing passenger throughput cap, imposed by Luton Borough Council (LBC) through the Original Planning Permission (see **Section 4.4**). This is because, it is the operational changes arising from this condition that generate additional surface access movements from a variety of transport modes.

6.2 Limitations of this assessment

- 6.2.1 It is common practice in air quality assessments (except assessments solely focusing on emissions from road traffic) to use at least three years of meteorological (met) data to ensure that the worst-case weather conditions are modelled. However, the nature of airport operations means that emissions are strongly tied to weather conditions, since aircraft normally land and take off into the wind. Given the modelling effort required to consider implications of inter-annual variation in met data, for this assessment it is not considered to be practical to model emissions in full detail with more than a single meteorological year. Instead, a sensitivity study has been carried out using five years of met data, but with a simplified model of the Site. The results of this sensitivity study are reported in **Section 6.10**. The key conclusion is that using 2017 met data for the dispersion modelling, with a scaling factor of 1.2, provides worst-case at the most critical receptors and provides a robust basis for the assessment.
- 6.2.2 It has not been possible to calculate short-term concentrations directly using the Atmospheric Dispersion Modelling System (ADMS) software, which is the usual approach for less complex emissions sources, because of the large number of sources modelled. Instead, the empirical relationships between short-term and annual mean concentrations, recommended by the Department for Environment, Food and Rural Affairs (Defra), have been used to estimate short-term concentrations (see **Appendix 6D** in **Volume 3: Figures and Appendices**).

6.3 Relevant legislation, planning policy, technical guidance

Legislative context

- 6.3.1 This section describes legislation relevant to the assessment of the effects on air quality receptors.
- 6.3.2 *Directive 2008/50/EC* on ambient air quality and cleaner air for Europe: *Directive 2008/50/EC* (the 'Ambient Air Directive'),⁴¹ which came into force in June 2008, consolidates previously existing European Union (EU)-wide air quality legislation (with the exception of *Directive 2004/107/EC*

⁴¹ Official Journal (2008). Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe, [online]. Available at: <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32008L0050> [Checked 23/11/2020].

⁴²relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons), and provides a new regulatory framework for particulate matter (PM) smaller than 2.5 µm (PM_{2.5}).

- 6.3.3 The *Ambient Air Directive* sets limit values (for the protection of human health) and critical levels (for the protection of vegetation and ecosystems) for selected pollutants that are to be achieved by specific dates, and details procedures EU Member States should take in assessing ambient air quality. Regulated pollutants include; sulphur dioxide (SO₂), nitrogen dioxide (NO₂), oxides of nitrogen (NO_x), particulate matter smaller than 10 µm (PM₁₀), particulate matter smaller than 2.5 µm (PM_{2.5}), lead (Pb), benzene (C₆H₆), and carbon monoxide (CO).
- 6.3.4 The limit values and critical levels are legally binding limits on concentrations of pollutants in the atmosphere, which can broadly be taken to achieve a certain level of environmental quality. The values are based on the assessment of the effects of each pollutant on human health, taking into account the effects on sensitive groups, such as children, the elderly, and those with health conditions, or on vegetation and ecosystems.
- 6.3.5 The limit values and critical levels relate to concentrations in ambient air. The *Ambient Air Directive* defines ambient air as outdoor air, and explicitly excludes workplaces, and other places to which members of the public do not have regular access.
- 6.3.6 The *Environment Act 1995*⁴³ and the *Air Quality (England) Regulations 2000*⁴⁴ require that Local Authorities periodically review air quality within their individual areas. This process of Local Air Quality Management (LAQM) is an integral part of delivering the Government's Air Quality Strategy and the Air Quality Objectives (AQOs) contained in the Strategy.
- 6.3.7 To carry out an air quality review and assessment under the LAQM process, local authorities produce an Annual Status Report each year. This describes areas identified to be at potential risk of exceeding the objectives in the regulations, and the progress made towards meeting the AQOs. The process aims to identify areas where national policies to reduce vehicle and industrial emissions are unlikely to result in air quality meeting the Government's AQOs by the required dates.
- 6.3.8 For the purposes of determining the focus of review and assessment, local authorities should have regard to those locations where members of the public are likely to be regularly present and are likely to be exposed over the averaging period of the objective.
- 6.3.9 Where the assessment indicates that one of the AQOs may be potentially exceeded, the local authority has a duty to declare an Air Quality Management Area (AQMA). The declaration of an AQMA requires the local authority to implement an Air Quality Action Plan, to reduce air pollution concentrations so that the required AQOs are met.
- 6.3.10 The *Air Quality Standards Regulations 2010*⁴⁵ came into force on 11 June 2010 and transpose *Directive 2008/50/EC*, including the limit values, into UK legislation. The duty to meet these limit values lies with the Secretary of State. The limit values in the *Air Quality Standards Regulations 2010* are generally referred to as Air Quality Standards (AQS).

⁴² Official Journal (2004). Directive 2004/107/EC of the European Parliament and of the Council of 15 December 2004 relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air, [online]. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32004L0107> [Accessed 23/11/2020].

⁴³ UK Government. Environment Act 1995, [online]. Available at: <http://www.legislation.gov.uk/ukpga/1995/25/contents> [Accessed 23/11/2020].

⁴⁴ UK Government. The Air Quality (England) Regulations 2000, [online]. Available at <http://https://www.legislation.gov.uk/uksi/2000/928/contents/made> [Accessed 23/11/2020]

⁴⁵ Department for Environment, Food & Rural Affairs. The Air Quality Standards Regulations 2010. Statutory Instrument 2010 No. 1001, [online]. Available at: <http://www.legislation.gov.uk/uksi/2010/1001/contents/made> [Checked 23/11/2020].

- 6.3.11 Similarly, to Directive 2008/50/EC, the Air Quality Standards Regulations define ambient air as outdoor air, and explicitly exclude workplaces and other places to which members of the public do not have regular access.

Planning policy context

- 6.3.12 A summary of the relevant planning policies is given in **Table 6.1**. Further details are given in **Appendix 6A** in **Volume 3: Figures and Appendices**.

Table 6.1 Planning policy issues relevant to air quality

Policy reference	Policy issue
The Air Quality Strategy for England, Scotland, Wales, and Northern Ireland⁴⁶	Provides a framework for improving air quality at a national and local level and supersedes the previous strategy published in 2000. It imposes a number of obligations on local authorities to manage air quality but does not directly impose obligations on developers.
Clean Air Strategy 2019⁴⁷	The Clean Air Strategy 2019 was issued by Defra to describe the government's approach to tackling air pollution in England. It runs parallel to the Air Quality Strategy but proposes that the LAQM regime may be overhauled in future. It increases the emphasis on ammonia and PM _{2.5} as pollutants of concern, including a commitment to halve the population living in areas with concentrations of fine particulate matter above World Health Organization (WHO) guideline levels (10 µg m ⁻³) by 2025. It also considers the contribution to be made by various sectors. Aviation is briefly discussed, but the Clean Air Strategy largely defers to Aviation Strategy.
National Planning Policy Framework⁴⁸ (NPPF)	A key part of the government's reforms to make the planning system less complex and more accessible. The framework acts as guidance for local planning authorities and decision-takers, both in drawing up plans and making decisions about planning applications.
National Planning Practice Guidance⁴⁹	Provides guidance on how planning can take account of the impact of new development on air quality.

Technical guidance

- 6.3.13 **Table 6.2** lists technical guidance documents which are relevant to the baseline data collection and assessment of the effects on air quality receptors. Further details are given in **Appendix 6A** in **Volume 3: Figures and Appendices**.

⁴⁶ GOV.UK (2011), *The air quality strategy for England, Scotland, Wales and Northern Ireland Volume 1*. [online] Available at: <https://www.gov.uk/government/publications/the-air-quality-strategy-for-england-scotland-wales-and-northern-ireland-volume-1> [Accessed 23/11/2020]

⁴⁷ Department for Environment, Food & Rural Affairs (2019), *Clean Air Strategy 2019*. [online] Available at: <https://www.gov.uk/government/publications/clean-air-strategy-2019>. [Accessed 23/11/2020]

⁴⁸ Ministry of Housing, Communities & Local Government (2019) *National Planning Policy Framework*. [online] Available at: <https://www.gov.uk/government/publications/national-planning-policy-framework--2> [Accessed 23/11/2020]

⁴⁹ Ministry of Housing, Communities & Local Government (2019) *Guidance: Air quality*. [online] Available at: <https://www.gov.uk/guidance/air-quality--3>. [Accessed 23/11/2020]

Table 6.2 Technical guidance relevant to air quality

Guidance	Relevance
World Health Organization (WHO) (2000, 2005), Air Quality Guidelines for Europe^{50,51}	Aims to provide a basis for protecting public health from adverse effects of air pollutants and to eliminate or reduce exposure to those pollutants that are known or likely to be hazardous to human health or well-being. These guidelines are intended to provide guidance and information to international, national, and local authorities making risk management decisions, particularly in setting air quality standards.
Environment Agency (2020), Air emissions risk assessment for your environmental permit⁵²	Contains long- and short-term assessment levels for releases to air derived from a number of published UK and international sources. Gives criteria for screening-out source contributions in the context of environmental permit applications. Although intended for use in evaluating permit applications, it is often used for planning applications where no better guidance is available (particularly for ecological receptors). This guidance also introduces the terms 'process contribution' (PC), meaning the concentration or deposition rate resulting from the development activities only, excluding other sources, and 'predicted environmental contribution' (PEC), meaning the total modelled concentration, equal to the PC plus the background contribution from all other sources. These terms are commonly used in air quality assessments, even where the term 'process' is not strictly accurate, and so are used in this assessment with 'process' referring to the Proposed Scheme.
Institute of Air Quality Management (IAQM) and Environmental Protection UK (EPUK), Land-use Planning and Development Control: Planning for Air Quality⁵³	Suggests how to classify the magnitude and significance of air quality effects from a new development for planning purposes. This guidance also promulgates the term air quality assessment level (AQAL) as a generic term for the various standards, objectives, limit values, etc. against which impacts need to be assessed.
IAQM, A guide to the assessment of air quality impacts on designated nature conservation sites⁵⁴	Gives guidance for assessing impacts at designated nature conservation sites.

Criteria appropriate to the assessment

- 6.3.14 There are a large number of sources of standards against which air quality should be assessed. These often use different terms for the assessment levels, including limit value, air quality standard (AQS), air quality objective (AQO), environmental assessment level (EAL), critical level (CLE), critical load (CL), and target. For simplicity, this document follows IAQM/EPUK (2017)⁵³ guidance in using the term 'air quality assessment level' (AQAL), or simply 'assessment level', to refer to any of these, unless it is useful to be more specific (e.g. to indicate the legal status of the AQAL).
- 6.3.15 **Table 6.3** sets out the AQALs that are relevant to this assessment.

⁵⁰ World Health Organization (2000). Air Quality Guidelines for Europe, Second Edition, [online]. Available at: http://www.euro.who.int/_data/assets/pdf_file/0005/74732/E71922.pdf [Checked 23/11/2020]. World Health Organization (2005). Air Quality Guidelines: Global update 2005, [online]. Available at: <http://www.euro.who.int/en/health-topics/environment-and-health/air-quality/publications/pre2009/airquality-guidelines.-global-update-2005.-particulate-matter,-ozone,-nitrogen-dioxide-and-sulfur-dioxide> [Checked 01/11/2020].

⁵¹ WHO (2006) Air Quality Guidelines: Global Update 2005. ISBN 92 890 2192 6.

⁵² Department for Environment, Food & Rural Affairs (2016) *Air emissions risk assessment for your environmental permit*. [online] available at: <https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit> .[Accessed 23/11/2020]

⁵³ Institute of Air Quality Management and Environmental Protection UK. *Land-Use Planning & Development Control: Planning For Air Quality*. [online] available at: <http://www.iaqm.co.uk/text/guidance/air-quality-planning-guidance.pdf> .[Accessed 23/11/2020]

⁵⁴ IAQM (2020). A guide to the assessment of air quality impacts on designated nature conservation sites, [online]. Available at: <https://iaqm.co.uk/guidance/> . [Checked 23/11/2020].

Table 6.3 Air quality standards, objectives, and environmental assessment levels

Pollutant	Receptors affected	Origin	Averaging period	Value
NO₂	Human	EU Directive limit value, AQO	Annual mean	40 µg m ⁻³
NO₂	Human	EU Directive limit value, AQO	1-hour mean, not to be exceeded more than 18 times a year (equivalent to 99.79th percentile)	200 µg m ⁻³
PM₁₀	Human	EU Directive limit value, AQO	Annual mean	40 µg m ⁻³
PM₁₀	Human	EU Directive limit value, AQO	24-hour mean, not to be exceeded more than 35 times a year (equivalent to 90.41th percentile)	50 µg m ⁻³
PM_{2.5}	Human	EU Directive limit value, AQO	Annual mean	25 µg m ⁻³
NO_x	Ecological	EU Directive critical level, AQO	Annual mean	30 µg m ⁻³
NO_x	Ecological	Environment Agency target	Daily mean	75 µg m ⁻³
NO_x	Ecological	WHO recommendation	Daily mean	200 µg m ⁻³ *
Nitrogen deposition	Ecological	Critical load	Annual mean	Site-specific
Acid deposition	Ecological	Critical load	Annual mean	Site-specific

* Where O₃ and SO₂ are not present above their critical levels.

Critical loads

6.3.16 Eutrophication critical loads are given as a range and have units of kg N ha⁻¹ y⁻¹. Generally, the lower end of the range should be used as a conservative assessment. The critical loads for acidification are more complicated, in that both the nitrogen and sulphur deposition fluxes must be considered at the same time. Therefore, a critical load function is specified for acidification, via the use of three critical load parameters:

- CL_{max}S – the maximum critical load of sulphur, above which the deposition of sulphur alone would be considered to lead to an exceedance;
- CL_{min}N – a measure of the ability of a system to ‘consume’ deposited nitrogen (e.g. via immobilisation and uptake of the deposited nitrogen); and
- CL_{max}N – the maximum critical load of acidifying nitrogen, above which the deposition of nitrogen alone would be considered to lead to an exceedance.

6.3.17 The Air Pollution Information System (APIS⁵⁵) contains information on applicable critical loads for various habitats and species. Critical load data extracted from APIS for the ecological receptors considered in this assessment is provided in **Appendix 6B** in **Volume 3: Figures and Appendices**. The critical loads reported are for the most sensitive qualifying habitat/species for that particular

⁵⁵ Natural England (2020). *Air Pollution Information System*. [online] Available at: <http://www.apis.ac.uk/> [Accessed 23/11/2020]

site and location, as reported by the APIS Site Relevant Critical Load tool and have been used in this assessment as a conservative approach.

6.4 Data gathering methodology

Study area

- 6.4.1 Assessments carried out for London Luton Airport (LLA) 18 million passengers per annum (mppa) planning application (the 2014 Planning Permission), as well as those carried out for other airports, show that total pollutant concentrations approach background levels on a distance scale of a few kilometres (km) or less from key airport sources. This sets the spatial scale of the area over which airport-related effects on local air quality have been assessed. Aircraft in the air have a limited impact on ground-level pollutant concentrations, with off-airport concentrations being dominated by emissions on the ground being blown horizontally, rather than dispersing downwards from overhead aircraft.
- 6.4.2 Road traffic journeys generated by LLA cover a large area, potentially hundreds of kilometres from the airport. The greatest proportion of airport-related traffic, and therefore potential impacts, is on roads that directly connect with LLA. It is not necessary to assess impacts on the entire road network used by airport-related traffic as a result of the Proposed Scheme, as the dispersion of this traffic means that impacts on the majority of the network would be negligible. Consideration of the principal routes used by airport-related traffic suggests that for air quality purposes, it is sufficient to consider traffic on the A1081, the A505, and selected other roads within a few kilometres of the Site. The M1 motorway between Junctions 9 and 11A have also been considered. These roads have relevant receptors close to them, and so they are expected to be the most sensitive to changes in airport-related traffic flows.

Desk study

- 6.4.3 A summary of the organisations that have supplied data, together with the nature of that data is as follows:
- APIS:
 - ▶ mapped background deposition rates; and
 - ▶ critical load information for nitrogen and acidity.
 - Defra:
 - ▶ mapped background air pollutant concentrations; and
 - ▶ air quality monitoring data.
 - Multi Agency Geographic Information for the Countryside (MAGIC)⁵⁶:
 - ▶ locations of sensitive ecological receptors; and
 - ▶ Ordnance Survey mapping data and georeferenced aerial imagery.
 - LBC:
 - ▶ air quality monitoring data.

⁵⁶ Department for Environment, Food & Rural Affairs. *MAGIC* [online] Available at: <https://magic.defra.gov.uk/> [Accessed 23/11/2020]

- LLAOL:
 - ▶ forecast and historical airport operational data; and
 - ▶ air quality monitoring data.

Survey work

- 6.4.4 In view of the extensive monitoring data available from LBC and LLAOL (see **Section 6.5**), it was not considered that any additional monitoring was required to determine baseline pollutant concentrations.

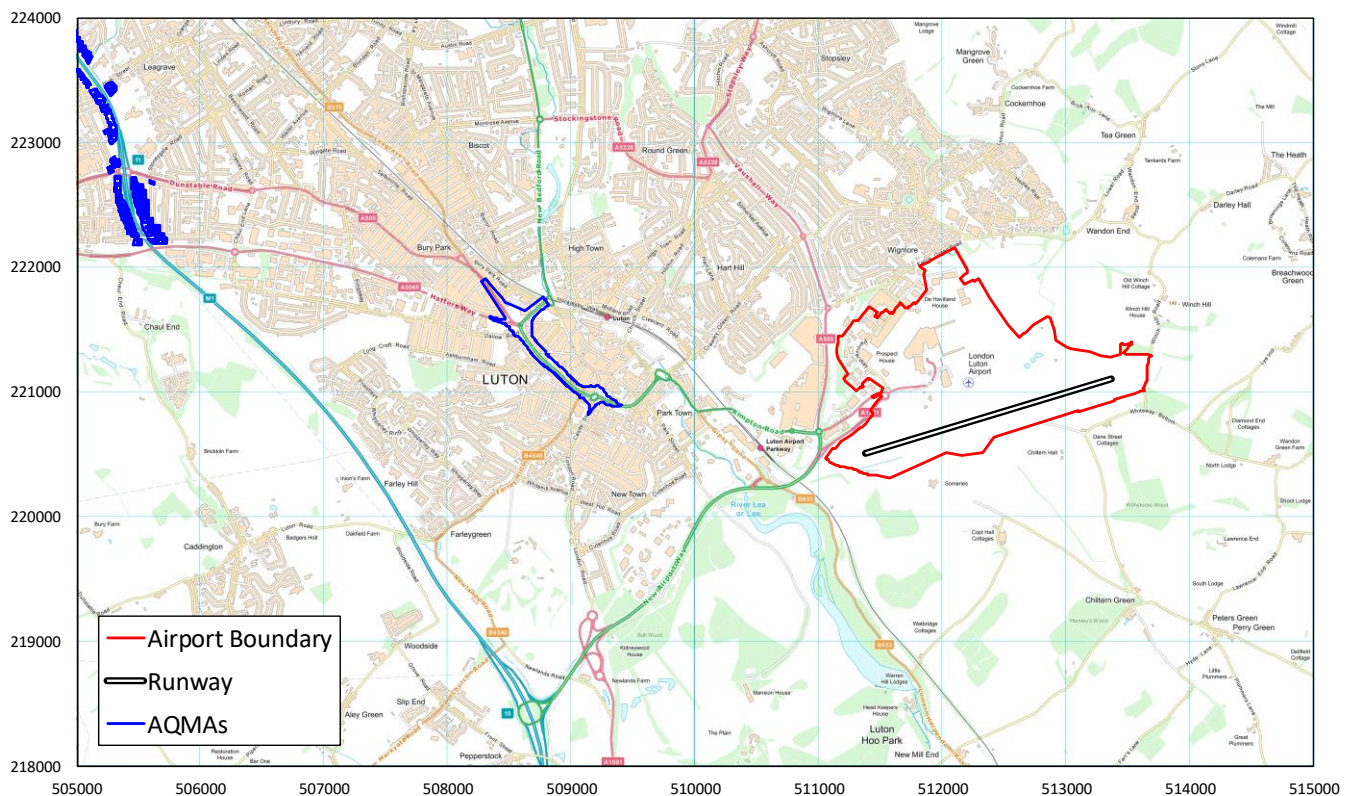
6.5 Overall baseline

Current baseline

Airport setting

- 6.5.1 A description of the location of LLA and the surrounding area is given in **Chapter 3: Description of the Proposed Scheme**, specifically **Section 3.2**. Some additional points of relevance to the air quality assessment are noted here. The airport location is shown in **Figure 6.1**.
- 6.5.2 Although LLA is located within the administrative area of LBC, the authority of North Hertfordshire lies immediately east and Central Bedfordshire lies immediately south of the Site.
- 6.5.3 LLA is located to the south of Luton, with the airport boundary close to the built-up urban area. Residential areas lie immediately north of the airport, north of Eaton Green Road. West of the airport there are industrial and commercial areas, with residential areas beyond. The area to the south and east of the airport is rural with isolated residential properties.
- 6.5.4 The airport is laid out with the terminal building in the centre. Aircraft stands are located around the terminal building, with an outer ring of ancillary buildings. The runway is on the south side of the Site. Road access is mostly from the M1 motorway via New Airport Way, which provides access to the south of the Site. This layout means there is a buffer of several hundred metres between the aircraft sources of emissions and most of the sensitive receptors.

Figure 6.1 Airport location in relation to AQMAs



Contains Ordnance Survey data © Crown copyright and database right 2019.

Local Air Quality Management

- 6.5.5 As part of their responsibilities under the Environment Act 1995⁴³, local authorities prepare annual reports on the air quality within their administrative areas and declare AQMAs in locations where there is a risk of an AQO being exceeded. LBC has declared three AQMAs for annual mean NO₂, covering part of Luton town centre, approximately 2 km east of the eastern runway end, and locations around the M1 motorway near Junction 11, approximately 6 km east of the airport (LBC 2019).⁵⁷ The AQMAs are shown in **Figure 6.1**.

Air quality monitoring

- 6.5.6 LBC undertook continuous monitoring at two stations in 2018⁵⁷. Of these, the LN60 station is located in the town centre AQMA and measures NO₂, PM₁₀, PM₄, PM_{2.5} and PM₁, while the LA08 station is located on the Airport south of the terminal building, and measures PM₁₀ only. Alongside this, passive monitoring of NO₂ with diffusion tubes was undertaken at 42 sites during 2018. Many of these are roadside or kerbside sites; at these sites, measurements are strongly influenced by local traffic conditions which are often not representative of other locations. Some monitoring takes place at urban background sites, which are more representative of urban areas away from major roads.
- 6.5.7 In addition, LLAOL deployed NO₂ diffusion tubes at eighteen sites in 2018. A 'supersite' monitoring station, Luton Airport FutureLuToN (LA001), was commissioned in June 2019, measuring a number

⁵⁷ Luton Borough Council (2019) 2019 Air Quality Annual Status Report (ASR). June 2019.

of pollutants including NO₂, NO_x, PM₁₀ and PM_{2.5}. A full calendar year's data from this station is not yet available.

6.5.8 Defra operates a continuous monitor, CM2, as part of the Automatic Urban and Rural Network on the east side of Luton, measuring NO₂.

6.5.9 The locations of the monitoring stations used to inform the assessment are summarised in **Table 6.4**, **Figure 6.2**, and **Figure 6.3**. Diffusion tubes that are not representative of locations that are likely to be affected by airport-related emissions are excluded.

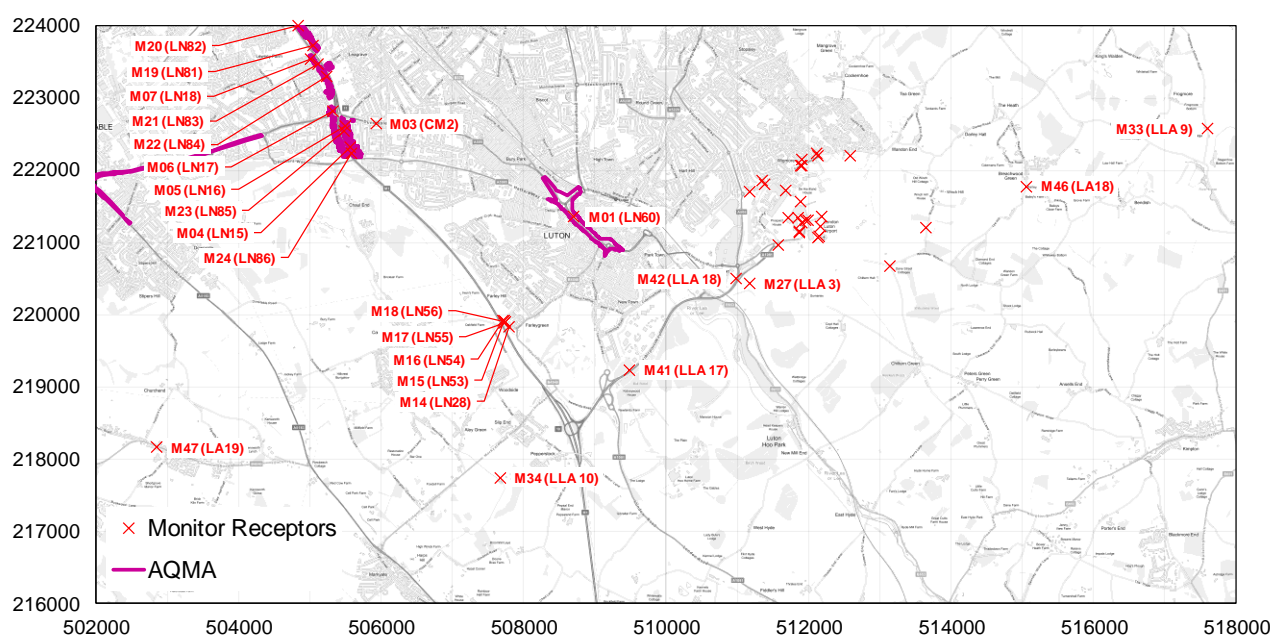
Table 6.4 Monitoring stations

Receptor ID	LBC ID and name	Type	Pollutants monitored	Classification	Coordinates	Approximate distance from LLA (km)
M01	LN60 (HB007) Dunstable Road East	Continuous	NO ₂ , PM ₁₀ , PM ₄ , PM _{2.5} , PM ₁	Roadside	508708, 221352	3.0
M02	LA08 (HB006) London Luton Airport	Continuous	PM ₁₀	Urban Background	511871, 221142	0.4
M03	CM2 (LUTR; UKA00605) Luton A505 Roadside (AURN)	Continuous	NO ₂	Roadside	505927, 222644	5.9
M04	LN15 Armitage Garden	Diffusion tube	NO ₂	Roadside	505557, 222325	6.2
M05	LN16 Belper Road	Diffusion tube	NO ₂	Roadside	505492, 222607	6.3
M06	LN17 Wyndham Road	Diffusion tube	NO ₂	Roadside	505324, 222812	6.5
M07	LN18 Copperfields	Diffusion tube	NO ₂	Roadside	505014, 223538	7.0
M08	LN22 1 Mistletoe Hill	Diffusion tube	NO ₂	Urban Background	511341, 221864	0.5
M09	LN23 Eaton Green Road 1	Diffusion tube	NO ₂	Roadside	511377, 221814	0.5
M10	LN24 19 Barnston Close	Diffusion tube	NO ₂	Urban Background	511902, 222144	0.7
M11	LN25 Eaton Green Road 2	Diffusion tube	NO ₂	Roadside	511893, 222068	0.6
M12	LN26 8 Keeble Close	Diffusion tube	NO ₂	Urban Background	512109, 222234	0.8
M13	LN27 Eaton Green Road 3	Diffusion tube	NO ₂	Roadside	512134, 222198	0.8
M14	LN28 Caddington Road	Diffusion tube	NO ₂	Roadside	507798, 219832	4.2
M15	LN53 3rd Floor Bagshawe Court FF.	Diffusion tube	NO ₂	Suburban	507717, 219923	4.3
M16	LN54 M1 Corner Bagshawe Court FF.	Diffusion tube	NO ₂	Suburban	507712, 219915	4.3
M17	LN55 M1 Corner Wyatt Court FF	Diffusion tube	NO ₂	Suburban	507732, 219886	4.3
M18	LN56 20 Wyatt Court FF	Diffusion tube	NO ₂	Suburban	507747, 219894	4.3

Receptor ID	LBC ID and name	Type	Pollutants monitored	Classification	Coordinates	Approximate distance from LLA (km)
M19	LN81 Bank Close	Diffusion tube	NO ₂	Suburban	505034, 223729	7.0
M20	LN82 11 Withy Close	Diffusion tube	NO ₂	Suburban	504828, 223999	7.3
M21	LN83 b/h 9 Copperfields	Diffusion tube	NO ₂	Suburban	505116, 223467	6.9
M22	LN84 97 Lime Avenue	Diffusion tube	NO ₂	Suburban	505230, 223304	6.7
M23	LN85 26 Belper Road	Diffusion tube	NO ₂	Suburban	505481, 222545	6.3
M24	LN86 Bradley Road (by M1 Bridge)	Diffusion tube	NO ₂	Roadside	505586, 222235	6.2
M25	LLA 1 Outside Zone 2	Diffusion tube	NO ₂	Other	511903, 221278	0.3
M26	LLA 2 (LA02) Airport Approach Road	Diffusion tube	NO ₂	Roadside	511579, 220960	0.6
M27	LLA 3 (LA03) Runway Threshold Western	Diffusion tube	NO ₂	Other	511170, 220436	1.2
M28	LLA 4 (LA04) Runway Threshold Eastern	Diffusion tube	NO ₂	Other	513644, 221207	2.0
M29	LLA 5 (LA05) Adjacent to Stand 5	Diffusion tube	NO ₂	Other	511711, 221337	0.2
M30	LLA 6 (LA06) President Way Jct	Diffusion tube	NO ₂	Roadside	511682, 221727	0.2
M31	LLA 7 Drop Off Zone	Diffusion tube	NO ₂	Roadside	512166, 221226	0.5
M32	LLA 8 (LA08) BAM Co-located	Diffusion tube	NO ₂	Other	511867, 221148	0.4
M33	LLA 9 (LA09) Stagenhoe Bottom Farm	Diffusion tube	NO ₂	Rural	517602, 222572	6.0
M34	LLA 10 (LA10) Grove Farm Slip End	Diffusion tube	NO ₂	Rural	507667, 217744	5.5
M35	LLA 11 (LA17) Dane End	Diffusion tube	NO ₂	Roadside	513140, 220669	1.7
M36	LLA 12 (LA14) Adjacent to Stand 60	Diffusion tube	NO ₂	Roadside	511886, 221566	0.2
M37	LLA 13 (LA15) Eaton Green Road	Diffusion tube	NO ₂	Roadside	511901, 222055	0.6
M38	LLA 14 Undercroft Access Road	Diffusion tube	NO ₂	Kerbside	511995, 221316	0.3
M39	LLA 15 Eaton Green Road – EasyJet CP	Diffusion tube	NO ₂	Kerbside	511168, 221706	0.6
M40	LLA 16 Exit Road Plaza	Diffusion tube	NO ₂	Roadside	512158, 221087	0.6
M41	LLA 17 A1081 New Airport Way 1	Diffusion tube	NO ₂	Roadside	509489, 219237	3.2
M42	LLA 18 A1081 New Airport Way 2	Diffusion tube	NO ₂	Roadside	510991, 220497	1.2

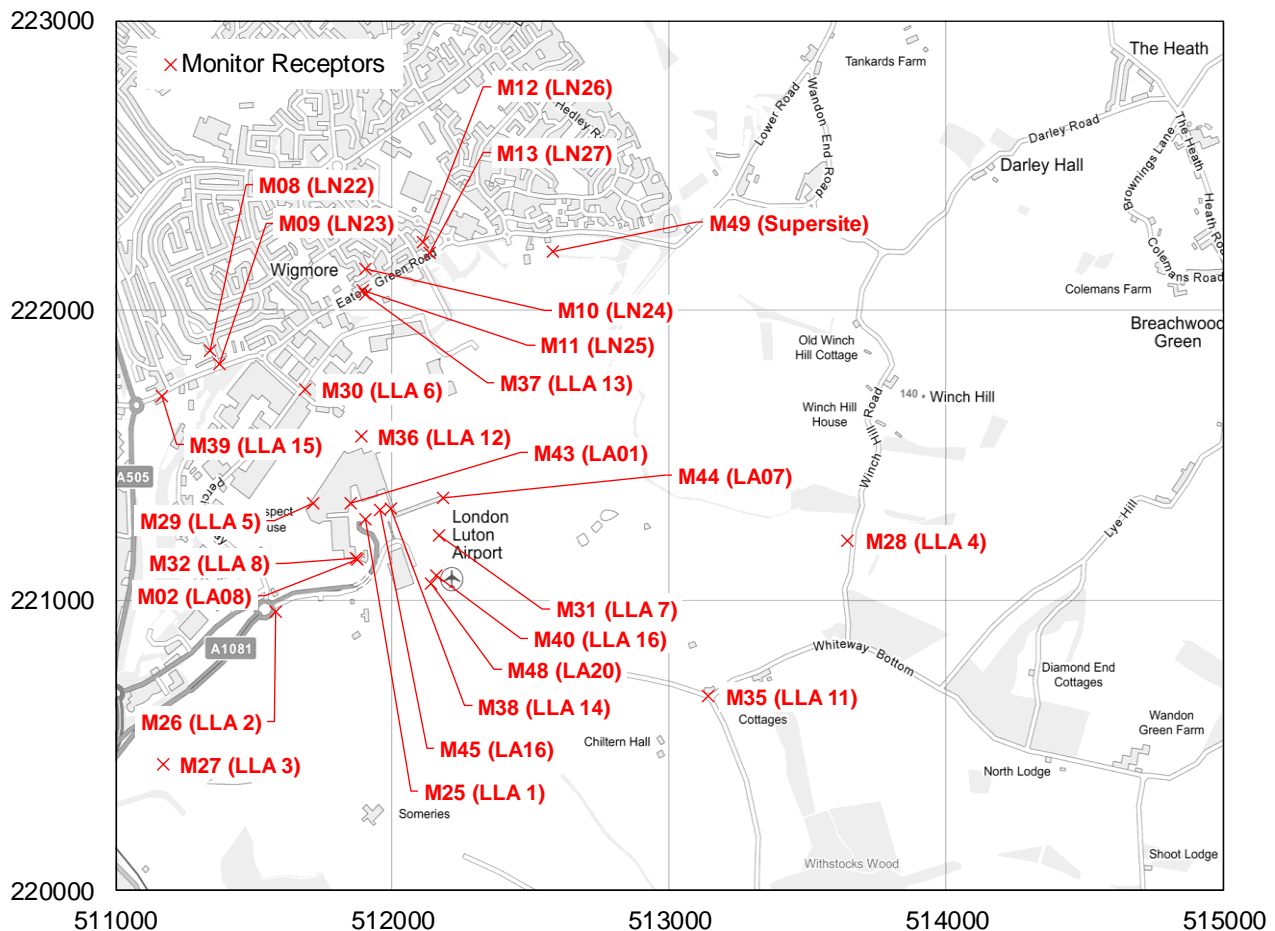
Receptor ID	LBC ID and name	Type	Pollutants monitored	Classification	Coordinates	Approximate distance from LLA (km)
M43	LA01 Terminal Patio	Diffusion tube	NO ₂	Other	511847, 221336	0.2
M44	LA07 Terminal Car Park	Diffusion tube	NO ₂	Other	512181, 221352	0.5
M45	LA16 Set Down Area	Diffusion tube	NO ₂	Kerbside	511954, 221313	0.3
M46	LA18 Breachwood Green	Diffusion tube	NO ₂	Kerbside	515053, 221778	3.4
M47	LA19 Kensworth	Diffusion tube	NO ₂	Kerbside	502848, 218161	9.5
M48	LA20 Short Term Car Park	Diffusion tube	NO ₂	Kerbside	512140, 221060	0.6
M49	LA001 Supersite	Continuous	NO ₂ , NO _x , PM ₁₀ , PM _{2.5}	Other	512578, 222204	1.1

Figure 6.2 Monitor locations used in modelling — all monitors



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Figure 6.3 Monitor locations used in modelling — monitors near LLA



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- 6.5.10 Monitored annual mean NO_2 concentrations are summarised in **Table 6.5**. These may be compared with the annual average AQO of $40 \mu\text{g m}^{-3}$ but note that the AQO does not apply at all monitoring locations, in particular those on the airport. The table therefore gives the distance to the nearest relevant exposure.
- 6.5.11 Inter-annual variations are generally of the magnitude expected from monitoring of this kind, with ranges across the six years between $5 - 10 \mu\text{g m}^{-3}$. Some of the on-airport monitors show much wider ranges. For example, M44 (LA07, Terminal Car Park) showed an increase from $23 \mu\text{g m}^{-3}$ in 2015 to $46 \mu\text{g m}^{-3}$ in 2017, presumably due to changes in airport activity near the diffusion tube location.
- 6.5.12 Over the period 2013 to 2018, monitored annual mean NO_2 concentrations at urban background locations were in the range $20 - 25 \mu\text{g m}^{-3}$, while concentrations at rural locations were in the range $7 - 13 \mu\text{g m}^{-3}$. These recorded values are typical of similar locations in England. Concentrations at roadside and kerbside locations were much higher, with a broad spread between $11 - 50 \mu\text{g m}^{-3}$, depending on local traffic conditions, and the exact location of the monitor relative to the road.
- 6.5.13 Concentrations at monitors around Eaton Green Road (LN22–LN27, LLA 13, LLA 15), which may be representative of residential properties experiencing the greatest impacts from the airport, were in the range $20 - 37 \mu\text{g m}^{-3}$. The greatest concentrations were measured at M09 (LN23), which reached $36 \mu\text{g m}^{-3}$ in 2016 and $37 \mu\text{g m}^{-3}$ in 2017 but was $32 \mu\text{g m}^{-3}$ or below in other years and reduced to $30 \mu\text{g m}^{-3}$ in 2018.

6.5.14

Overall, concentrations at these locations show a downward trend over the period 2013 – 2018, averaging about $0.5 \mu\text{g m}^{-3}$ decrease per year. Again, this is typical of measurements recorded elsewhere in England. The greatest increasing trend was observed at M09 (LN23), which as noted above had relatively high concentrations in 2016 and 2017, before falling back in 2018.

Table 6.5 Monitored annual mean NO_2 concentrations ($\mu\text{g m}^{-3}$)

Receptor ID	Distance to relevant exposure (m)	2013	2014	2015	2016	2017	2018	Average
M01	6.2	NDA	NDA	43	47	39	37	41.5
M03	17.1	NDA	NDA	45	50	44	43	45.5
M04	7	33	32	30	31	30	26	30.3
M05	5	36	37	35	36	35	30	34.8
M06	4	39	41	36	39	36	34	37.5
M07	2	31	30	26	28	24	24	27.2
M08	0	23	23	21	25	23	22	22.8
M09	18	32	32	32	36	37	30	33.2
M10	0	23	24	21	24	22	20	22.3
M11	17	29	31	28	30	29	28	29.2
M12	0	21	22	21	21	20	20	20.8
M13	6	28	28	28	30	30	28	28.7
M14	15	44	49	43	46	46	40	44.7
M15	0	34	34	33	34	33	28	32.7
M16	0	33	40	32	34	34	27	33.3
M17	0	38	36	31	34	33	29	33.5
M18	0	33	33	32	34	31	30	32.2
M19	19	NDA	NDA	NDA	NDA	38	32	35.0
M20	0	NDA	NDA	NDA	NDA	32	27	29.5
M21	13	NDA	NDA	NDA	NDA	25	25	25.0
M22	8.5	NDA	NDA	NDA	NDA	27	25	26.0
M23	0	NDA	NDA	NDA	NDA	NDA	28	28.0
M24	21	NDA	NDA	NDA	NDA	42	37	39.5
M25	700	NDA	NDA	NDA	NDA	NDA	46	46.0
M26	880	32	33	29	40	38	38	35.0

Receptor ID	Distance to relevant exposure (m)	2013	2014	2015	2016	2017	2018	Average
M27	1,000	23	22	17	24	23	25	22.3
M28	550	19	18	13	17	19	18	17.3
M29	585	36	38	34	43	40	40	38.5
M30	230	30	32	26	34	35	35	32.0
M31	900	NDA	NDA	NDA	NDA	NDA	44	44.0
M32	820	26	28	24	34	32	32	29.3
M33	30	12	11	7	10	11	11	10.3
M34	30	13	13	9	12	11	12	11.7
M35	130	NDA	11	11	15	15	15	13.4
M36	420	32	33	29	39	38	38	34.8
M37	35	26	27	21	27	25	26	25.3
M38	700	NDA	NDA	NDA	NDA	NDA	42	42.0
M39	32	NDA	NDA	NDA	NDA	NDA	32	32.0
M40	1,000	NDA	NDA	NDA	NDA	NDA	44	44.0
M41	230	NDA	NDA	NDA	NDA	NDA	40	40.0
M42	190	NDA	NDA	NDA	NDA	NDA	38	38.0
M43	620	34	35	28	31	33	NDA	32.2
M44	780	26	25	23	36	46	NDA	31.2
M45	690	32	37	30	41	40	NDA	36.0
M46	100	NDA	NDA	NDA	14	14	NDA	14.0
M47	11	NDA	NDA	NDA	12	NDA	NDA	12.0
M48	1,000	NDA	NDA	NDA	NDA	41	NDA	41.0
M49	75	NDA	NDA	NDA	NDA	NDA	NDA	NDA

NDA = No data available

6.5.15 Monitored annual mean NO_x concentrations are summarised in **Table 6.6**. There is no AQO for NO_x, which is not believed to have human health effects beyond those for NO₂, a component of NO_x⁵⁸. NO_x measurements are only available from continuous monitors, so there is less data than for NO₂. Measurements at the continuous monitors suggest that at these roadside locations the annual mean NO₂ concentration is approximately 40% of the annual mean NO_x concentration.

⁵⁸ for regulatory purposes NO_x is considered a distinct pollutant from NO₂ (see paragraph 6.7.6).

Table 6.6 Monitored annual mean NO_x concentrations (µg m⁻³)

Receptor ID	Distance to relevant exposure (m)	2013	2014	2015	2016	2017	2018	Average
M01	6.2	NDA	NDA	103	125	101	87	104.0
M03	17.1	NDA	NDA	114	141	117	111	120.8

NDA = No data available

6.5.16 Monitored annual mean PM₁₀ concentrations are summarised in **Table 6.7**. These may be compared with the AQO of 40 µg m⁻³, but this AQO does not apply at all monitoring locations.

6.5.17 Over the period 2013 to 2018, monitored annual mean PM₁₀ concentrations at the M02 (LA08, HB006) continuous monitor, sited on LLA, were in the range 15 – 21 µg m⁻³, well below the AQO of 40 µg m⁻³. The number of days per year where the daily average PM₁₀ concentration was over 50 µg m⁻³ was at most six, well within the AQO of 35 days per year over 50 µg m⁻³.

Table 6.7 Monitored annual mean PM₁₀ concentrations (µg m⁻³)

Receptor ID	Distance to relevant exposure (m)	2013	2014	2015	2016	2017	2018	Average
M01	6.2	NDA	NDA	15	15	16	16	15.5
M02	800	21	18	15	18	18	17	17.8

NDA = No data available

6.5.18 Monitored annual mean PM_{2.5} concentrations are summarised in **Table 6.8**. These may be compared with the AQO of 25 µg m⁻³ and the WHO recommended target of 10 µg m⁻³.

6.5.19 Over the period 2013 to 2018, monitored annual mean PM_{2.5} concentrations at the M01 (LN60, HB007) continuous monitor, sited in Luton town centre, were in the range 9 – 10 µg m⁻³, well below the AQO of 25 µg m⁻³ and meeting the WHO guideline level of 10 µg m⁻³.

Table 6.8 Monitored annual mean PM_{2.5} concentrations (µg m⁻³)

Receptor ID	Distance to relevant exposure (m)	2013	2014	2015	2016	2017	2018	Average
M01	6.2	NDA	NDA	9	10	10	10	9.8

NDA = No data available

Defra background concentration modelling

6.5.20 Defra maintains a nationwide model (the Pollution Climate Mapping (PCM) model⁵⁹) of current and future background air quality concentrations at a 1 km grid square resolution. The data sets include annual average concentration estimates for NO_x, NO₂, PM₁₀ and PM_{2.5}, as well as other pollutants. The PCM model is semi-empirical in nature: it uses data from the National Atmospheric Emissions

⁵⁹ Department of Environment, Food and Rural Affairs (2017). *Defra national Pollution Climate Mapping (PCM) modelled background concentrations*. [online] Accessed at : <https://data.gov.uk/dataset/394bf17d-ef9f-4649-b628-64d99de69618/defra-national-pollution-climate-mapping-pcm-modelled-background-concentrations> [Accessed 23/11/2020]

Inventory (NAEI) ⁶⁰to model the concentrations of pollutants at the centroid of each 1 km grid square but then calibrates these concentrations in relation to actual monitoring data. Concentrations represent background locations, not roadside locations or those particularly influenced by point sources.

- 6.5.21 The dataset was updated in 2020 for a reference year of 2018. Data is available for years covering 2018 to 2030, with modelled concentrations generally decreasing over that time period.
- 6.5.22 The dataset for the area around LLA includes a contribution from current aircraft and other activity occurring on the airport. Defra provides a mechanism for subtracting out particular contributions. The results presented in **Table 6.9** to **Table 6.12** include this current contribution from the airport, but the airport contribution has been removed for the actual assessment to avoid double-counting.
- 6.5.23 Concentrations of NO₂, NO_x, PM₁₀ and PM_{2.5} from the Defra data for 2018 are given in **Table 6.9** to **Table 6.12**. Concentrations of NO₂ are also shown graphically in **Figure 6.4**. These all fall well below corresponding AQOs and are broadly typical of urban background locations in England.

Table 6.9 Annual mean background NO₂ concentrations (µg m⁻³)

Northing	Easting						
	509500	510500	511500	512500	513500	514500	515500
222500	16.9	17.4	16.7	16.7	14.8	13.1	11.6
221500	20.4	17.3	25.3	21.8	19.6	13.2	11.3
220500	18.6	20.0	21.6	19.9	14.2	11.8	10.9
219500	19.9	15.2	14.8	13.4	12.0	11.2	10.7
218500	16.0	13.1	12.9	13.3	11.5	10.9	10.6

Source: Defra data, 2018⁵⁹

Table 6.10 Annual mean background NO_x concentrations (µg m⁻³)

Northing	Easting						
	509500	510500	511500	512500	513500	514500	515500
222500	23.7	24.5	23.5	23.5	20.6	17.9	15.5
221500	29.7	24.4	39.6	32.9	28.8	18.0	15.1
220500	26.6	29.1	32.4	29.4	19.5	15.9	14.4
219500	28.8	20.9	20.4	18.2	16.2	14.9	14.1
218500	22.0	17.7	17.4	18.0	15.3	14.5	14.1

Source: Defra data, 2018⁵⁹

⁶⁰ UK Government. *National Atmospheric Emissions Inventory*. Available at: <https://naei.beis.gov.uk/> [Accessed 23/11/2020]

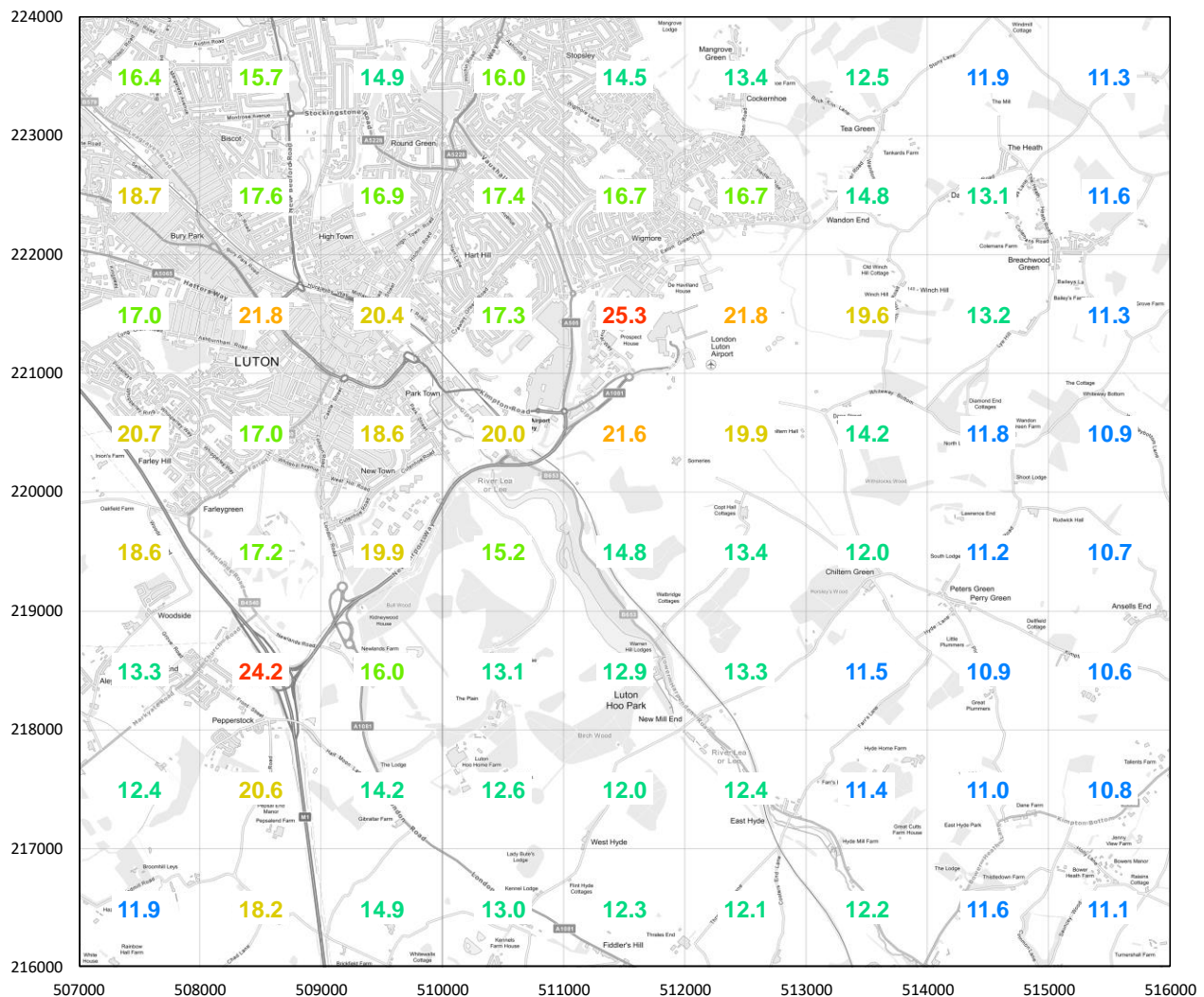
Table 6.11 Annual mean background PM₁₀ concentrations (µg m⁻³)

Northing	Easting						
	509500	510500	511500	512500	513500	514500	515500
222500	16.7	16.4	15.9	15.4	15.8	15.8	15.2
221500	16.4	16.1	16.2	15.7	15.6	15.8	16.3
220500	16.9	16.8	15.9	15.1	15.7	15.5	15.5
219500	16.4	16.1	15.6	15.5	15.4	15.8	15.8
218500	16.6	15.2	14.9	15.9	15.6	15.5	15.6

Source: Defra data, 2018⁵⁹Table 6.12 Annual mean background PM_{2.5} concentrations (µg m⁻³)

Northing	Easting						
	509500	510500	511500	512500	513500	514500	515500
222500	11.5	11.3	11.0	10.5	10.2	10.0	9.8
221500	11.2	11.0	11.0	10.4	10.1	10.0	10.0
220500	11.5	11.4	10.5	10.0	10.0	9.8	9.8
219500	11.0	10.4	10.2	10.0	9.9	9.9	9.9
218500	10.6	10.0	9.9	10.1	9.9	9.8	9.8

Source: Defra data, 2018⁵⁹

Figure 6.4 Annual mean background NO₂ concentrations ($\mu\text{g m}^{-3}$)

Source: Defra data, 2018⁵⁹. Contains Ordnance Survey data © Crown copyright and database right 2019.

Comparison of monitoring with Defra data

6.5.24 In **Table 6.13**, measured NO₂ concentrations at urban background and rural monitors are compared with the Defra concentrations for the corresponding grid square (both for 2018). The measured concentrations are slightly higher than the Defra concentrations at three of the five monitoring locations, but overall, there is good agreement between the datasets.

Table 6.13 Monitored concentrations vs Defra concentrations for NO₂ (µg m⁻³), in 2018

ID and name	Classification	Measured	Defra	Difference
M08 (LN22 1 Mistletoe Hill)	Urban Background	22	25.3	-3.3
M10 (LN24 19 Barnston Close)	Urban Background	20	16.7	3.3
M12 (LN26 8 Keeble Close)	Urban Background	20	16.7	3.3
M33 (LLA 9 (LA09) Stagenhoe Bottom Farm)	Rural	11	10.4	0.6
M34 (LLA 10 (LA10) Grove Farm Slip End)	Rural	12	12.4	-0.4

Source: Defra data, 2018⁵⁹ and LBC data⁵⁷.

6.5.25 There is no urban background or rural monitoring data available for NO_x, PM₁₀ or PM_{2.5}.

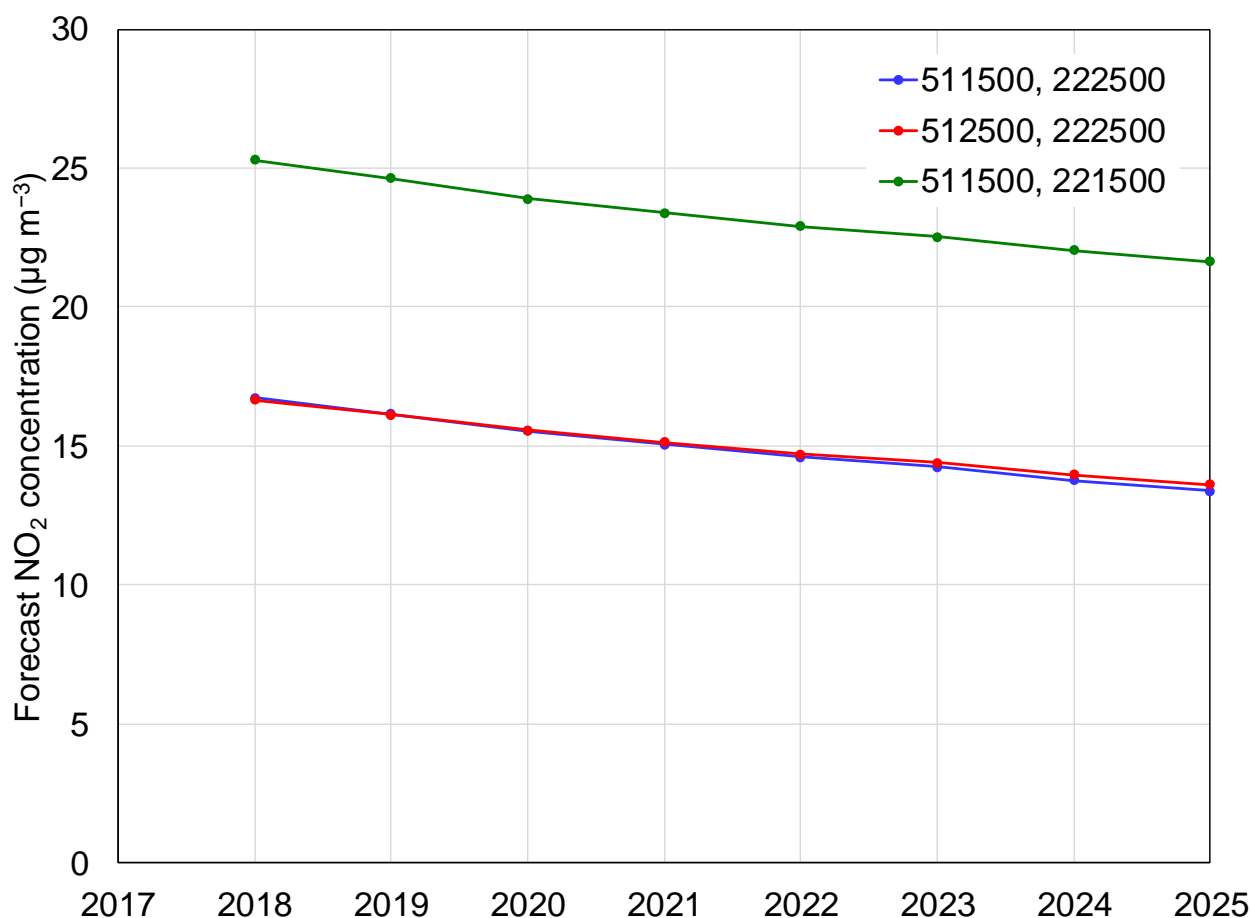
APIS background mapped deposition rates

6.5.26 The APIS website provides information on background deposition of nitrogen and sulphur at sensitive ecological sites in the UK (refer to **Appendix 6B** in **Volume 3: Figures and Appendices**). APIS is widely recognised as the primary source of this information and has been used for the air quality assessment.

Future baseline

6.5.27 In the absence of the Proposed Scheme, the baseline is likely to change in future for a number of reasons.

6.5.28 Air quality in the UK is generally improving as a result of controls on emissions sources, such as engines that meet tighter emission standards in newer road vehicles. As described above, Defra issues projections of background (non-roadside) concentrations on a 1 km square basis, up to 2030. The total projected concentrations of NO₂ are shown in **Figure 6.5** for a typical grid square covering LLA (green line) and two grid squares covering nearby receptors (red and blue lines). Concentrations are expected to fall by about 15% between 2018 and 2024, or about 0.5 µg m⁻³ per year. This trend may be compared with monitoring data, which as shown above is also falling at about 0.5 µg m⁻³ per year.

Figure 6.5 Trend in modelled background NO₂ concentrations

6.5.29 Concentrations near roads are also expected to decline as a result of emission controls, though this may be partly offset by a general national increase in traffic levels. Projections of emission factors for road vehicles are provided by Defra up to 2030. Projections of changes in traffic have been taken into account in the traffic assessment and are considered in the air quality assessment.

6.5.30 In view of the good agreement between the Defra modelled NO₂ concentrations and monitored concentrations, the Defra concentration in the relevant grid square has been used as the best estimate of the background concentration of annual mean NO₂ at all receptors, as this makes concentrations available throughout the modelled domain. For the model evaluation (which models 2017 emissions for comparison against monitoring data for the same year), concentrations for 2017 have been used⁶¹. For the 18 mppa and 19 mppa scenario assessments (which model emissions in 2024, when 19 mppa is forecast to be reached), 2024 concentrations have been used. The airport and in-square major road contributions have been removed from the Defra modelled concentrations to avoid double-counting since these sources are modelled explicitly using scenario-specific data.

6.5.31 For NO_x, PM₁₀ and PM_{2.5}, there is no suitable monitoring data without an airport contribution, so the same approach of using the modelled Defra concentrations for 2017 and 2024 has been used, with airport and in-square major road contributions removed.

6.5.32 The annual average contribution from modelled airport and road traffic emissions is combined with the annual average background concentration to give a total concentration at each receptor

⁶¹ The current version of the Defra maps (base year 2018) does not include 2017, so the previous version (base year 2017) was used for the 2017 model evaluation.

location. This total concentration can then be compared against the relevant assessment level and the likelihood of an exceedance determined.

- 6.5.33 Background deposition rates of all pollutants have been taken from the APIS website, based on the most sensitive habitat feature at each designated site. No information is available on future deposition rates, so these have conservatively been assumed to be the same as the current baseline, despite there being a predicted downward trend in emissions of pollutants.
- 6.5.34 Committed developments have been reviewed to identify additional sources of emissions that are likely to arise in future. The main new developments of relevance are residential, which may generate additional road traffic. These have been included in the traffic model (**Chapter 10: Transport**). No other developments have been identified that are likely to have a significant effect on air pollutant concentrations at receptors close to the Site. No developments have been identified that would add receptors that are likely to be affected by the Proposed Scheme.
- 6.5.35 The background concentrations of air in 2024 at each of the specific receptors, as assumed in the modelling for this assessment, are given in **Appendix 6B in Volume 3: Figures and Appendices**. The background deposition rates at each of the specific ecological receptors, as assumed in the modelling for this assessment, are given in **Appendix 6B in Volume 3: Figures and Appendices**. Details of the receptor locations are given in **Section 6.7** and **Appendix 6C in Volume 3: Figures and Appendices**.

6.6 Consultation

- 6.6.1 **Table 6.14** provides an overview of air quality issues that were raised during the non-statutory consultation, identifies how the EIA has had regard to those issues, and where further information can be found in this chapter.

Table 6.14 Summary of issues raised during non-statutory consultation regarding air quality

Issue raised	Consultee	Response and how considered in this chapter	Section Ref
A number of comments received expressed concerns about the impact of the proposals on local air quality, including from increased traffic resulting from the proposals, and on Luton Council's commitment to improve air quality.	Various	This air quality assessment has assessed the likely significant effects arising from the proposed change to increase the passenger throughput cap from 18 mppa to 19 mppa. The scope of this assessment was agreed with Luton Borough Council. It is the operational changes arising from this passenger uplift that would generate additional surface access movements from a variety of transport modes.	Section 6.10
Some suggestions were received for air quality mitigation measures, such as that the airport work to reduce aircraft emissions and fund research into more environmentally friendly aircraft engines.	Various	LLAOL has since 2019 implemented differential charging to the airlines to incentivise the rapid modernisation of aircraft fleets to help reduce emissions.	Section 6.8

6.7 Scope of the assessment

Spatial scope

- 6.7.1 The spatial scope of the assessment of air quality covers the area of the Proposed Scheme, together with the Zones of Influence (Zols) that have formed the basis of the study area described in **Section 6.4**. The modelled domain was chosen to ensure that all significant impacts from airport-related sources are captured.

Temporal scope

- 6.7.2 The temporal scope of the assessment of air quality is consistent with the period over which the Proposed Scheme would be carried out and therefore covers the operational period.
- 6.7.3 The following three operational scenarios have been assessed:
- calendar year 2017, for model evaluation (to see how well the model performs by comparing its outputs for a historic case with monitored data, and to determine if any model adjustment is necessary). This year was chosen to align with the traffic model baseline;
 - calendar year 2024, with airport activity constrained to its current cap of 18 mppa (a “without scheme” case); and
 - calendar year 2024, with airport activity allowed to grow to 19 mppa (a “with scheme” case).
- 6.7.4 The year 2024 was chosen as this is the year in which LLA is forecast to reach 19 mppa if the Proposed Scheme is approved.

Pollutants assessed

- 6.7.5 The air quality assessment focuses on the local air pollutants which present a risk of actual or potential exceedances of AQALs, including AQOs, EU limit values, targets, critical levels, or critical loads at locations in the UK (not necessarily in the vicinity of the Site). These are NO_x, NO₂, PM₁₀ and PM_{2.5} in relation to concentrations in air, and nutrient nitrogen and acidity in relation to deposition. PM₁₀ and PM_{2.5} are collectively referred to as PM in this document. A brief description of these pollutants is provided in **Table 6.15**. Other potential pollutants have been scoped out.

Table 6.15 Summary of the pollutants assessed

Pollutant	Description and effect on human health and the environment	Principal sources
Oxides of Nitrogen (NO_x)	Nitrogen dioxide (NO ₂) and nitric oxide (NO) are both collectively referred to as oxides of nitrogen (NO _x). It is NO ₂ that is associated with adverse effects on human health. Most atmospheric emissions are in the form of NO which is converted to NO ₂ in the atmosphere through reactions with ozone. The oxidising properties of NO ₂ theoretically could damage lung tissue, and exposure to very high concentrations of NO ₂ can lead to inflammation of lung tissue, affect the ability to fight infection. The greatest impact of NO ₂ is on individuals with asthma or other respiratory conditions, but consistent impacts on these individuals is at levels of greater than 564 µg m ⁻³ , much higher than typical UK ambient concentrations.	All combustion processes produce NO _x emissions, and the principal source of NO _x is road transport, which accounted for 34% of total UK emissions in 2016. Emissions from power stations contributed a further 22%.
Particulate matter (PM₁₀ and PM_{2.5})	<p>PM is the term used to describe all suspended solid matter. PM with an aerodynamic diameter of less than 10 µm (PM₁₀) is the subject of health concerns because of its ability to penetrate and remain deep within the lungs.</p> <p>The health effects of particles are difficult to assess, and evidence is mainly based on epidemiological studies. Evidence suggests that there may be associations between increased PM₁₀ concentrations and increased mortality and morbidity rates, changes in symptoms or lung function, episodes of hospitalisation or doctor's consultations. Recent reviews by the WHO and Committee on the Medical Effects of Air Pollutants (COMEAP) have suggested exposure to a finer fraction of particles (PM_{2.5}) gives a stronger association with the observed health effects. PM_{2.5} typically makes up around two-thirds of PM₁₀ emissions and concentrations.</p>	Road transport, industrial processes, and electricity generation. Other pollutants, including NO ₂ and SO ₂ , have the potential to form secondary particulates which are often smaller than PM ₁₀ .

- 6.7.6 NO and NO₂ are emitted as a result of combustion processes (from aircraft, equipment, heating plant and vehicles for example). Chemical reactions in the atmosphere convert NO to NO₂ (mostly through reaction with ozone) and vice versa (through photolysis during daylight hours). The sum of NO and NO₂ is referred to as NO_x. NO_x and NO₂ are considered separately for regulatory purposes. For example, some regulations and air quality assessment levels relate to NO₂ while others relate to NO_x.

Potential receptors

- 6.7.7 The modelled domain covers both a set of gridded receptors (to enable contour plots to be generated and interpolation to intermediate locations if required) and sets of specific receptors

representing individual sensitive human and ecological locations, plus monitoring locations (for the model evaluation).

Gridded receptors

- 6.7.8 An 8 km × 6 km Cartesian grid covering the airport and its vicinity was modelled, with a receptor resolution of 100 m, to assess the impact of atmospheric emissions from the Site on local air quality. This resolution is considered suitable for capturing the maximum impacts from the airport. In addition, a larger 16 km × 9 km grid covering the whole of the Luton urban area was modelled, with a receptor resolution of 200 m, to ensure that impacts on the wider population were addressed.

Human receptors

- 6.7.9 Guidance from the UK Government and Devolved Administrations established that exceedances of the health-based AQOs should be assessed at outdoor locations where members of the general public are regularly present over the averaging time of the objective. **Table 6.16** provides an indication of those locations that may or may not be relevant for each averaging period.

Table 6.16 Examples of where the Air Quality Objectives should apply for human receptors

Averaging Period	Objectives should apply at:	Objectives should generally not apply at:
Annual mean	All locations where members of the public might be regularly exposed. Building facades of residential properties, schools, hospitals, care homes etc.	Building facades of offices or other places of work where members of the public do not have regular access. Hotels, unless people live there as their permanent residence. Gardens of residential properties. Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term.
1-hour mean	All locations where the annual mean objectives would apply. Hotels. Gardens of residential properties*. Kerbside sites (e.g. pavements of busy shopping streets). Those parts of car parks, bus stations and railway stations etc. which are not fully enclosed, where the public might reasonably be expected to spend one hour or more. Any outdoor locations at which the public may be expected to spend one hour or longer.	Kerbside sites where the public would not be expected to have regular access.

* For gardens, such locations should represent parts of the garden where relevant public exposure is likely, for example where there is a seating or play areas. It is unlikely that relevant public exposure would occur at the extremities of the garden boundary, or in front gardens, although local judgement should always be applied.

- 6.7.10 The receptors considered were chosen based on locations where people may be located for the periods discussed in the guidance given above. Details of the locations of human receptors are given in **Appendix 6C in Volume 3: Figures and Appendices**. Receptors S01–S13 are relevant for hourly-mean concentrations only; these include hotels and recreational facilities. A receptor height of 1.6 m was chosen to reflect typical breathing heights.
- 6.7.11 For the purpose of assessing air quality impacts, workplace locations have been excluded from the assessment in accordance with Schedule 1, Part 1, Paragraph 2 of the *Air Quality Standards*

*Regulations 2010.*⁶⁵ These Regulations are detailed in **Section 6.3** and do not differentiate between whether this is a workplace location under the control of the operator, or an off-site workplace location.

Ecological receptors

6.7.12 The Environment Agency⁶² provides guidance on appropriate screening distances for designated ecological sites. Although this guidance is intended for permit applications, it is commonly used for other types of air quality assessment. The guidance states:

"Check if there are any of the following within 10 km of your site (or within 15 km for coal or oil-fired power stations):

- *Special protection areas (SPAs);*
- *Special areas of conservation (SACs); and*
- *Ramsar sites (protected wetlands).*

Check if there are any of the following within 2 km of your site:

- *Sites of special scientific interest (SSSIs); and*
- *Local nature sites (ancient woods, local wildlife sites and national and local nature reserves).*

Some larger (greater than 50 megawatt) emitters may be required to screen to 15 km for European sites and to 10 km or 15 km for SSSIs."

6.7.13 Using this guidance, ecological sites have been reviewed for assessment. No SPAs, SACs, Ramsar sites, SSSIs, national nature reserves, or local nature reserves have been identified that meet the criteria for assessment. A number of ancient woodland sites have been identified that meet the criteria, and receptors have been chosen to represent these sites. These are shown in **Appendix 6C** in **Volume 3: Figures and Appendices**.

Likely significant effects

6.7.14 The potentially significant effects on air quality from the Proposed Scheme, which are subject to further discussion in this chapter, are summarised below.

Sources of emissions

6.7.15 The following aspects of the Proposed Scheme have potential to affect air quality and/or odour:

- increased aircraft movements, on the ground and in the air;
- increased use of ground support equipment (GSE); and
- increased landside road activity.

Potentially significant effects on human health

6.7.16 It is unlikely that the Proposed Scheme will result in air quality impacts that are likely to have significant effects (in EIA terms) on human health. Of the potential air quality impacts on human health, the greatest risk of significant effects is from annual mean NO₂. Given that LLA will operate at a steady level of activity over time (except for daytime/night-time differences), it is much less

⁶² Environmental Agency. *Air emissions risk assessment for your environmental permit*. [online] Available at: <https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit> [Accessed 23/11/2020]

likely that short-term (i.e. hourly mean) NO₂ concentrations will cause significant effects. Concentrations of other pollutants such as PM₁₀ or PM_{2.5} are also less likely to cause significant effects. However, they have been included in the assessment to provide confidence in this conclusion.

Potentially significant effects on ecological sites

- 6.7.17 Concentrations of NO_x in air are associated with adverse effects on plant growth and have been included in this assessment.
- 6.7.18 In addition, emissions of NO_x and sulphur oxides to the air may result in deposition onto ecological sites, which may be sensitive to both nutrient nitrogen and acid deposition. Emissions of sulphur oxides from the Proposed Scheme are negligible, but the impacts of NO_x on nitrifying and acid deposition have been included in the assessment.

Summary of effects that have been assessed

- 6.7.19 The effects that have been included in this assessment are summarised in **Table 6.17**.

Table 6.17 Effects that have been assessed for air quality

Activity	Impact	Potential effect
Airport operational activity (including aircraft movements, GSE)	Increased combustion emissions as a result of increased aircraft movements and handling.	Increased concentrations of air pollutants that could affect human health (NO ₂ and PM) at sensitive receptors (residential properties, schools, medical facilities), or could affect ecological sites.
Landside road traffic	Increased combustion emissions as a result of increased road traffic.	Increased concentrations of air pollutants that could affect human health (NO ₂ and PM) at sensitive receptors (residential properties, schools, medical facilities), or could affect ecological sites.

Potential effects not requiring assessment

- 6.7.20 Potential effects not requiring assessment were described in the Screening report (**Appendix 1A in Volume 3: Figures and Appendices**), Screening Opinion (**Appendix 1B in Volume 3: Figures and Appendices**) and Scoping Meeting (**Appendix 1C in Volume 3: Figures and Appendices**).
- 6.7.21 The Proposed Scheme can be accommodated without any new on-airport infrastructure and so will not require any construction activity.
- 6.7.22 Airport operation can be a source of odour which causes loss of amenity to nearby receptors. However, odour impacts are not expected to be significant as a result of the Proposed Scheme and have been scoped out of further assessment in this ES. This approach has been agreed with LBC through screening and scoping exercises. Therefore, impacts from odour have not been assessed further.

6.8 Environmental measures embedded into the scheme proposal

- 6.8.1 A range of environmental measures have been embedded into the scheme proposal as outlined in **Section 3.5. Table 6.18** outlines how these embedded measures will influence the air quality assessment.

Table 6.18 Summary of the embedded environmental measures and how these influence the air quality assessment

Receptor	Changes and effects	Embedded measures and influence on assessment
Human health and ecological receptors	Potential effects upon human health and ecological resources as a result of emissions from aircraft movements on the ground and during the landing and take-off (LTO) cycle.	As part of normal operational practice, planning of aircraft arrival and departure scheduling to avoid, over-long idling, taxiing and hold times. The airfield layout has been designed to minimise times for taxiing and holding. Encourage use of reduced-engine taxiing. Use of Fixed Electrical Ground Power, where available, to minimise engine or auxiliary power unit (APU) use.
Human health and ecological receptors	Potential effects upon human health and ecological resources as a result of emissions from aircraft GSE.	As part of normal operational practice, planning of aircraft arrival and departure scheduling to avoid, over-long operation of liquid fossil-fuelled GSE.

6.9 Assessment methodology

- 6.9.1 The generic project-wide approach to the assessment methodology is set out in **Chapter 4: Approach to preparing the Environmental Statement**, and specifically in **Sections 4.5 to 4.7**. However, whilst this has informed the approach that has been used in this air quality assessment, it is necessary to set out how this methodology has been applied, and adapted as appropriate, to address the specific needs of this air quality assessment.

Calculation of emissions and dispersion modelling

- 6.9.2 The methodology for calculating emissions and concentrations of pollutants is summarised here. Further technical detail is given in **Appendix 6D** in **Volume 3: Figures and Appendices**.
- 6.9.3 The air quality assessment predicts concentrations of NO_x, NO₂, PM₁₀ and PM_{2.5}. The air quality modelling leads directly to forecasts of annual mean concentrations of the identified pollutants. Concentrations for shorter averaging periods, which are relevant for some AQALs, have been derived from annual mean values, using relationships that have been recommended in technical guidance for Local Air Quality Management (LAQM) Review and Assessment⁶³. This is necessary because the very large number of sources associated with an airport cannot practically be included in a single dispersion model run.

Aircraft emissions

- 6.9.4 Emissions from the following sources have been calculated:
- aircraft on the ground, including landing roll, taxi-in, pushback, taxi-out, hold, take-off-roll, aircraft auxiliary power unit (APU) usage, brake wear, and tyre wear;
 - aircraft in the air up to 3,000 ft (914 m), including approach, initial climb, and climb-out; and
 - ground support equipment (GSE).
- 6.9.5 Emissions have been calculated using a bottom-up approach, based on multiplying activity levels by appropriate emission factors. Data on activity levels has been provided by LLAOL, supplemented

⁶³ Defra (2018) *Local Air Quality Management: Technical Guidance (TG16)*. February 2018.

by data from comparable airports. Emission factors have been taken from the International Civil Aviation Organization's (ICAO) engine certification databank and other standard published sources.

- 6.9.6 Emissions have been assigned to spatial elements based on the airfield layout and standard aviation operational practice (for example for taxiing routes). The spatially-defined emissions were then entered into the dispersion modelling tool Atmospheric Dispersion Modelling System (ADMS), which calculates concentrations of pollutants at receptors. Deposition rates at ecological receptors have been calculated from concentrations in air using standard deposition velocities.
- 6.9.7 Throughout the modelling process, care has been taken not to risk underpredicting impacts. Where data is not available, or assumptions need to be made, conservative assumptions have been made.

Road traffic emissions

- 6.9.8 The contribution to pollutant concentrations from road traffic on roads around the Site has been assessed using data generated as part of the transport assessment (see **Chapter 10: Transport**). Contributions from airport-related and non-airport traffic have been included on key road links around the Site. Emissions have been calculated using Defra's Emission Factors Toolkit (EFT) v10.1. ADMS-Roads was used to perform the dispersion modelling and calculate concentrations at receptors. The roads model was verified and adjusted using the procedure recommended by Defra in their LAQM guidance TG(16)⁶³.

Impact significance

- 6.9.9 The significance of effects on NO₂ and PM concentrations in the air at human receptors has been assessed in accordance with guidance developed by the Institute of Air Quality Management (IAQM) and Environmental Protection UK (EPUK) (see **Section 6.3**). The IAQM/EPUK significance criteria take account of both the incremental change in air quality at relevant receptors and the absolute concentration in relation to AQALs and defines descriptors for the level of impact.
- 6.9.10 The overall significance of the effect has then been determined using professional judgement. One of the relevant factors to consider is the potential for cumulative effects, e.g. in cases where several 'slight' impacts (in IAQM/EPUK terms) on receptors individually could, taken together, be regarded as having a significant effect for the purposes of air quality management in an area. Conversely, a 'moderate' or 'substantial' impact may not have a significant effect if it is confined to a very small area and where it is not obviously the cause of harm to human health.
- 6.9.11 For ecological receptors, the criteria recommended in Environment Agency guidance and IAQM commentary (see **Section 6.3**) have been used to provide an initial screening of significance. Where impacts cannot be screened out as insignificant, they will be assessed further by specialist ecologists.

6.10 Assessment of air quality effects

- 6.10.1 This section summarises the results of the dispersion modelling and compares predicted ground level concentrations against the assessment criteria detailed in **Section 6.3**. The contribution to the predicted concentrations from the airport (i.e. the process contribution (PC)) are presented along with the total predicted environmental concentrations (PEC), which include the background contribution from sources unrelated to the airport. These concentrations are then compared with the relevant AQAL (standard, objective, target, or guideline value).
- 6.10.2 Results are given here for the key receptors for each assessment criterion.

- 6.10.3 Please note that results are given to several decimal places. This is to enable comparison between receptors and between PC and PEC contributions. The number of decimal places should not be taken as providing any indication of the accuracy of the results.

Meteorological data sensitivity study

- 6.10.4 In order to ascertain the effects of meteorological data on model results, a sensitivity study was carried out using a simplified emissions model. The purpose of this was to ensure that the assessment of future years was representative of the meteorological conditions that produce the greatest air quality impacts.
- 6.10.5 For this study, emissions from the Site were calculated for the 19 mppa case and distributed uniformly over a single volume source covering the LLA's runway and aprons. Emissions from roads were not included, since these were subject to a separate verification and adjustment procedure, in accordance with standard modelling recommendations. Three years of met data were used, from 2016 to 2018, from the Luton Airport meteorological station.
- 6.10.6 The wind roses for the three years' meteorological data are shown in **Figure 6.6** to **Figure 6.8**. These show the frequency of winds from each direction, with different colours for different wind speeds. It can be seen that there is a strong preponderance of winds from the south-west quarter in each year. However, there is some variation in the total number of winds from this direction: the year 2018 had a significant fraction of north-easterly winds. South-easterly winds are uncommon which means that, in general, winds do not blow pollution from the airport towards the main residential areas.

Figure 6.6 Wind rose for 2016

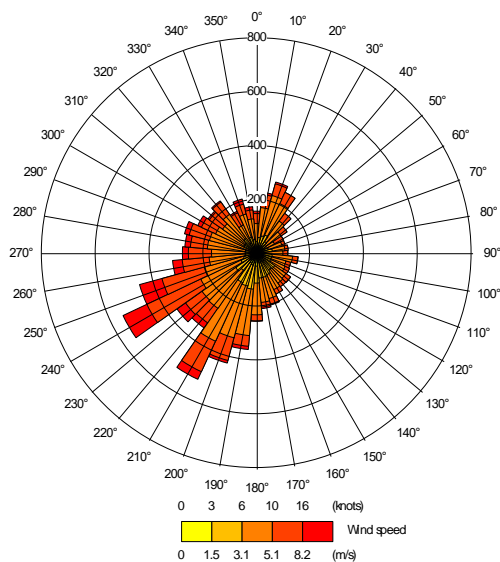


Figure 6.7 Wind rose for 2017

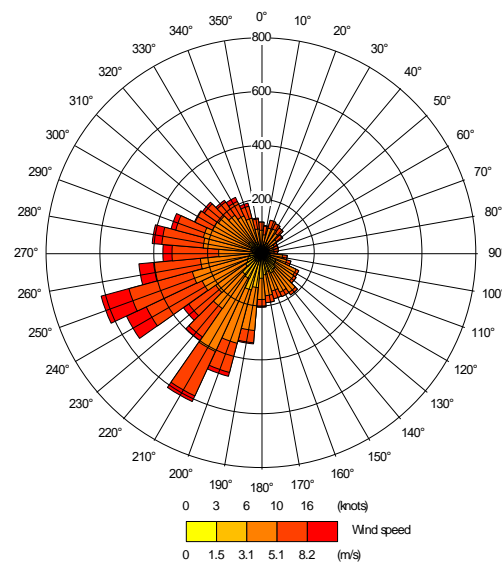
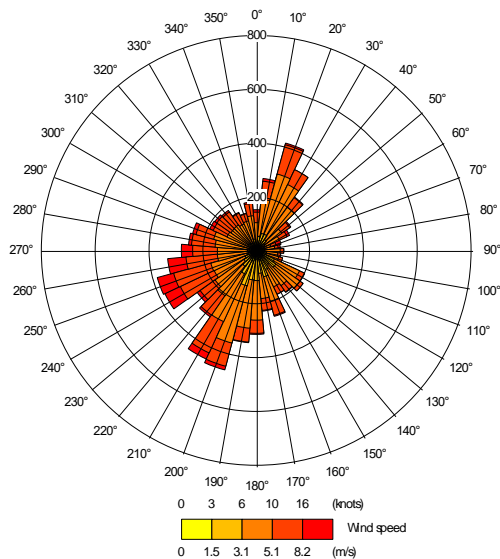


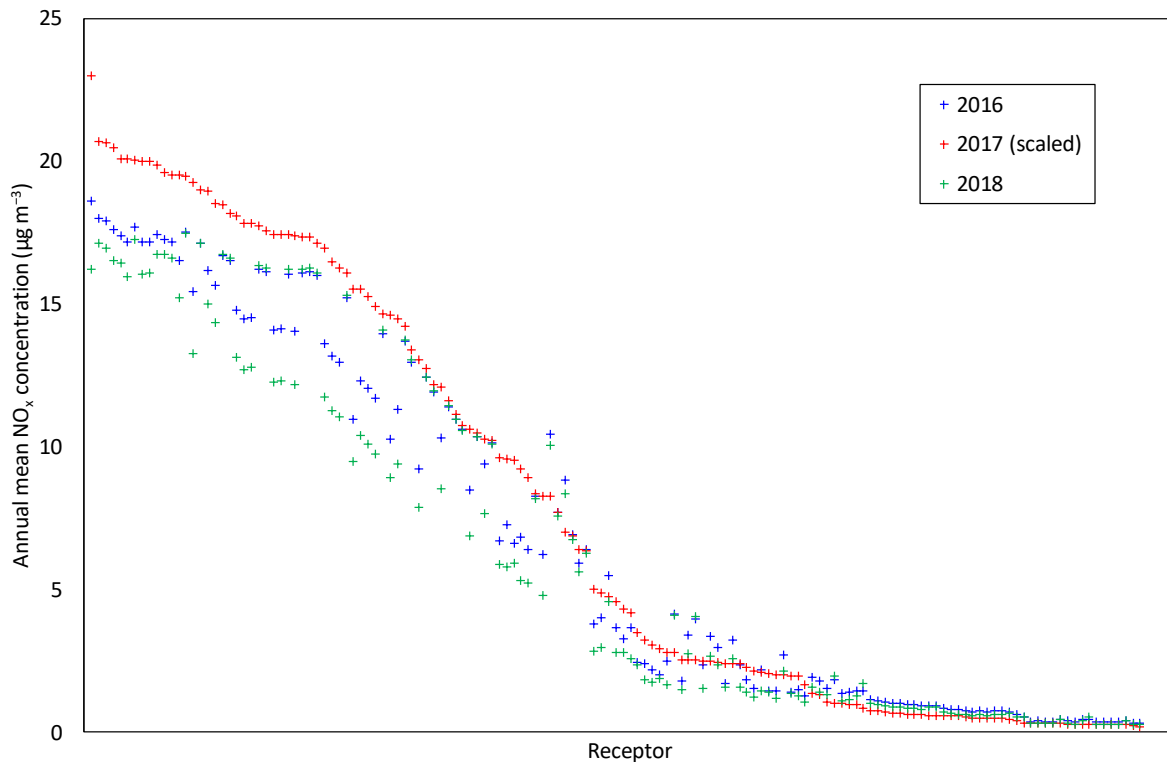
Figure 6.8 Wind rose for 2018



6.10.7 The modelling results showed that in terms of concentrations at sensitive receptors, the differences between the years' meteorological data are fairly small, reflecting the similarity in the wind roses. This tallies with the monitoring results presented in **Section 6.5**, which do not show considerable inter-year variation. None of the meteorological data for each of the years produced consistently higher concentrations at the receptors than the other years. It was therefore decided that a scaling factor should be used to account for potential variation as a result of meteorological conditions. Scaling the concentrations for the 2017 meteorological year by a factor of 1.2 was found to result in concentrations that are consistently higher than other meteorological years.

6.10.8 **Figure 6.9** shows the modelled NO_x concentrations at each of the specific receptors, for each of the three meteorological years, with 2017 scaled up by a factor of 1.2. The x-axis of the figure represents the receptor where concentrations are modelled, sorted so that the receptors that have the highest concentrations with 2017 meteorological data are at the left of the diagram. It can be seen that at most receptors, the highest concentrations are given by the scaled 2017 meteorological data (red crosses). At the receptors with the highest concentrations (i.e. those closest to the airport; shown on the left of the diagram), this is very consistent, and the concentrations are markedly higher for 2017 than for other years. At some receptors, the scaled 2017 results are not the worst-case, but the modelled NO_x concentrations at these locations are less than half the highest concentrations (no more than $10 \mu\text{g m}^{-3}$ compared with a maximum of $23 \mu\text{g m}^{-3}$), so these will not affect the conclusions of the assessment.

Figure 6.9 Met sensitivity study: annual mean NO_x concentrations (µg m⁻³) for different met years



- 6.10.9 Therefore, the modelled results presented in this report for future years are based on 2017 meteorological data with the concentrations multiplied by a factor of 1.2. This ensures that the worst meteorological conditions have been used in the assessment with a suitable degree of conservatism, in accordance with best modelling practice.
- 6.10.10 The results of this sensitivity study demonstrate that using just 2017 meteorological data for the dispersion modelling, with the scaling factor of 1.2, is a worst-case at the most critical receptors and provides a robust basis for the assessment.

Predicted effects and their significance: operational phase

- 6.10.11 This section sets out the results of the dispersion modelling for 2024 and compares predicted ground level concentrations against the assessment criteria detailed in **Section 6.3**. The predicted increase in concentrations resulting from the Proposed Scheme (known as the process contribution or PC) are presented; this is the increment of the concentrations in the 19 mppa scenario relative to the 18 mppa scenario. Also presented are the total predicted environmental concentrations (PEC) for the 19 mppa scenario, which include the background contribution from sources unrelated to the airport. These concentrations are then compared with the relevant air quality assessment level (AQAL: standard, objective, 'target' or guideline value).
- 6.10.12 Modelled concentrations include the contributions from operational activity on the airport such as aircraft (including at height beyond the airport boundary) and GSE, and road traffic on the modelled links (both airport-related and non-airport).
- 6.10.13 Full tables of results are given in **Appendix 6E** in **Volume 3: Figures and Appendices**.

Human health effects: nitrogen dioxide (NO₂)

- 6.10.14 Predicted concentrations of annual mean NO₂ are found to increase by at most 0.7 $\mu\text{g m}^{-3}$, or 2% of the AQAL, at any of the modelled receptors where humans may be exposed over the course of a year; this occurs at receptor H83 close to the M1 motorway near Junction 11. The total NO₂ concentration (PEC) here is modelled to be 22 $\mu\text{g m}^{-3}$ or 55% of the AQAL.
- 6.10.15 Of receptors close to the airport, the greatest PC is at the H76 receptor, representing Dane Street Farm, where the PC is 0.4 $\mu\text{g m}^{-3}$ or 1% of the AQAL, and the PEC is 16 $\mu\text{g m}^{-3}$ or 40% of the AQAL. Of receptors along Eaton Green Road, the greatest PC is 0.4 $\mu\text{g m}^{-3}$ or 1% of the AQAL at the H41 receptor, where the PC is 22 $\mu\text{g m}^{-3}$ or 56% of the AQAL.
- 6.10.16 The impact of the Proposed Scheme is classified as **negligible** at all modelled receptors using the IAQM criteria.
- 6.10.17 A full table of results is given in **Appendix 6E** in **Volume 3: Figures and Appendices**. A contour plot of total annual mean NO₂ for the 19 mppa scenario is shown in **Figure 6.10**, and a contour plot of the PC (i.e. the increase due to the Proposed Scheme, relative to the 18 mppa scenario) is shown in **Figure 6.11**.

Figure 6.10 Annual mean NO₂ concentrations, 19 mppa scenario

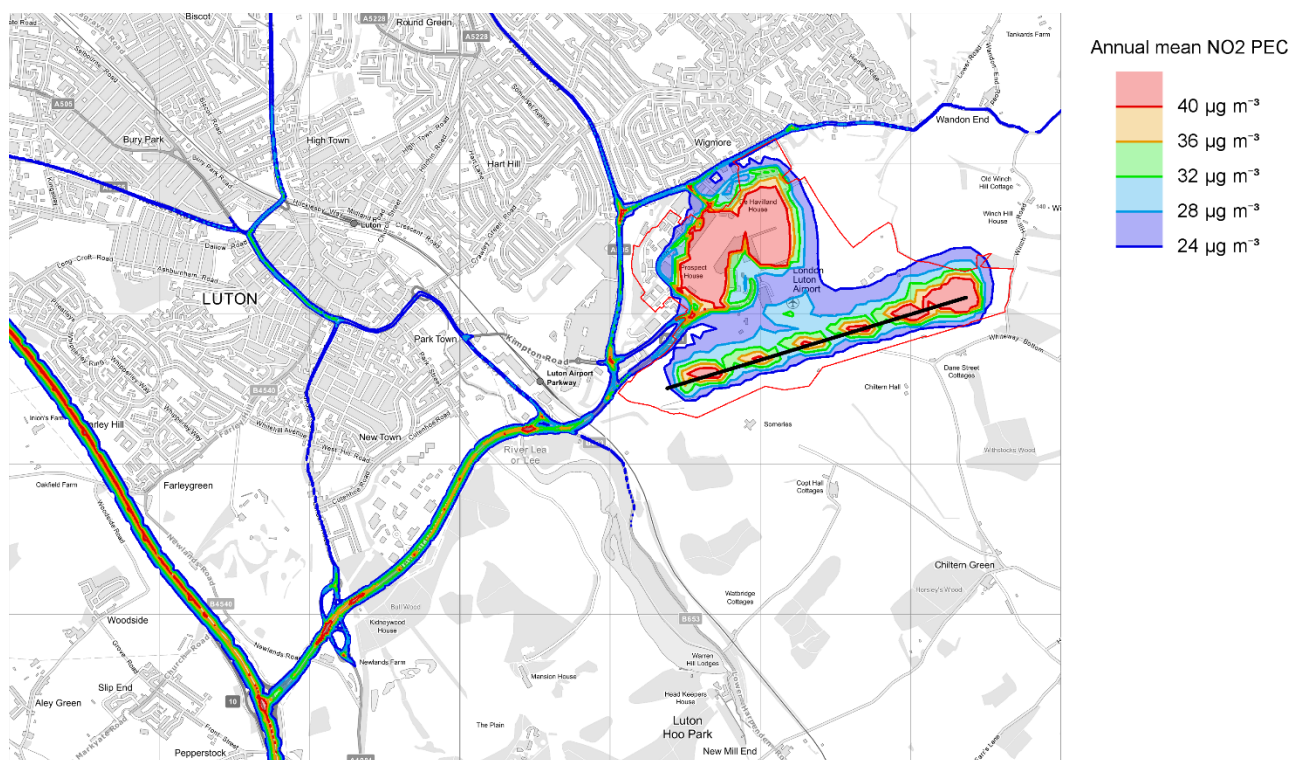
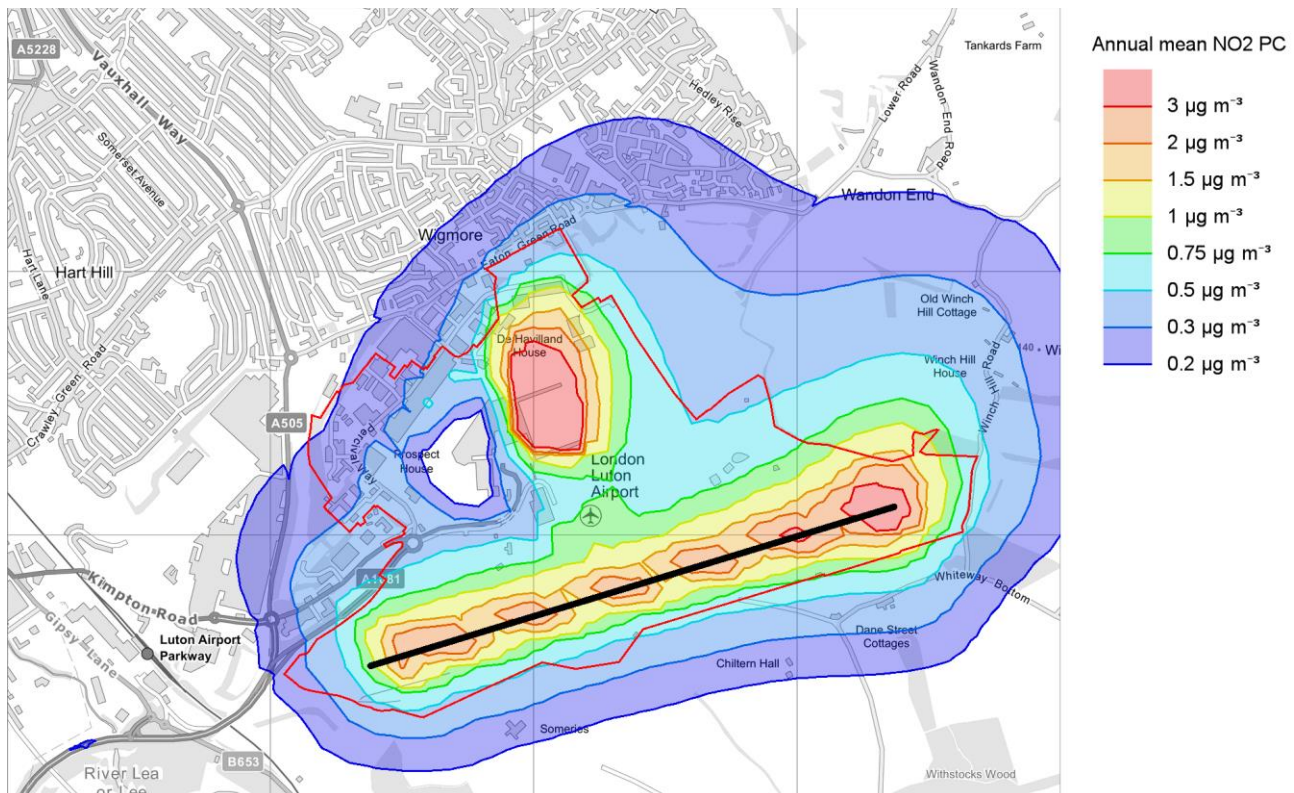


Figure 6.11 Increase in annual mean NO₂ concentrations from 18 mppa to 19 mppa

- 6.10.18 Concentrations of NO₂ are higher at some locations where there may be short-term exposure. At receptor S08, representing the Holiday Inn, close to Airport Way, the increase in annual mean NO₂ is 0.4 µg m⁻³ giving a total concentration of 35 µg m⁻³ in the 19 mppa scenario. However, concentrations of annual mean NO₂ are everywhere well below 60 µg m⁻³, so according to Defra guidance⁶³, there is **no risk of any exceedance of the hourly mean NO₂ AQO**.

Human health effects: PM₁₀

- 6.10.19 Predicted concentrations of annual mean PM₁₀ are found to increase by at most 0.16 µg m⁻³, or 0.4% of the AQAL, at any of the modelled receptors where humans may be exposed over the course of a year; this occurs at receptor H83 close to the M1 motorway near Junction 11. The greatest predicted total concentration of annual mean PM₁₀ is 20 µg m⁻³ or 50% of the AQAL, at the same receptor. The impact of the Proposed Scheme is classified as **negligible** at all relevant receptors using the IAQM criteria.
- 6.10.20 The AQO for daily mean PM₁₀ is 50 µg m⁻³, not to be exceeded more than 35 times per year. The greatest number of days above 50 µg m⁻³ is 4, at the H83 receptor near the M1 motorway. There is therefore **no risk of an exceedance of the AQO for daily mean PM₁₀**.
- 6.10.21 A full table of results is given in **Appendix 6E** in **Volume 3: Figures and Appendices**.

Human health effects: PM_{2.5}

- 6.10.22 Predicted concentrations of annual mean PM_{2.5} are found to increase by at most 0.1 µg m⁻³, or 0.4% of the AQAL, at any of the modelled receptors where humans may be exposed over the course of a year; this occurs at receptor H83 close to the M1 motorway near Junction 11. The greatest predicted total concentration of annual mean PM_{2.5} is 13 µg m⁻³ or 51% of the AQAL, at the same receptor. The impact of the Proposed Scheme is classified as **negligible** at all relevant receptors under IAQM criteria.

- 6.10.23 The PEC is predicted to exceed the WHO guideline of $10 \mu\text{g m}^{-3}$ at most of the modelled receptors in both the 18 mppa and 19 mppa scenarios. There are no receptors where the total $\text{PM}_{2.5}$ concentration is below $10 \mu\text{g m}^{-3}$ in the 18 mppa scenario but over $10 \mu\text{g m}^{-3}$ in the 19 mppa scenario. The PC is less than 1% of the WHO guideline at all modelled receptors. The Proposed Scheme is therefore considered to be consistent with the $\text{PM}_{2.5}$ target in the Clean Air Strategy 2019. The impacts of the Proposed Scheme can be classified as **not significant**.
- 6.10.24 A full table of results is given in **Appendix 6E** in **Volume 3: Figures and Appendices**.

Ecological effects: NO_x

- 6.10.25 Predicted concentrations of annual mean NO_x are found to increase by at most $3 \mu\text{g m}^{-3}$, or 8% of the AQAL, at any of the modelled ecological receptors; this occurs at receptor E05 representing Winchill Wood. The greatest predicted total concentration of annual mean NO_x at any of the modelled receptors is $88 \mu\text{g m}^{-3}$ or 294% of the AQAL, at receptor E39 representing Kidney and Bulls Woods; however, this receptor, although within the Ancient Woodland boundary according to MAGIC⁵⁶, is actually on the carriageway of the New Airport Way road and should therefore be treated as an overestimate of the actual impact at the ancient woodland. Excluding this receptor, the greatest predicted total concentration of annual mean NO_x is $63 \mu\text{g m}^{-3}$ or 210% of the AQAL, at receptor E27 representing Kidney and Bulls Woods.
- 6.10.26 There are several receptors where the modelled annual mean NO_x is above the AQAL of $30 \mu\text{g m}^{-3}$, where the Winchill Wood, Chalk Wood and Kidney and Bulls Woods are close to major roads. The PCs at these receptors are less than 10% of the AQAL. Under Environment Agency guidance⁶², because these receptors are of local importance only, the impacts of the Proposed Scheme can be classified as **not significant**.
- 6.10.27 A full table of results is given in **Appendix 6E** in **Volume 3: Figures and Appendices**.

Ecological effects: nitrogen deposition

- 6.10.28 Predicted nitrogen deposition rates are found to increase by at most $0.4 \text{ kg N ha}^{-1} \text{ y}^{-1}$, or 4% of the AQAL, at any of the modelled ecological receptors; this occurs at receptor E05 representing Winchill Wood. The greatest predicted total nitrogen deposition rate at any of the modelled receptors is $32 \text{ kg N ha}^{-1} \text{ y}^{-1}$ or 325% of the AQAL, at receptor E23 representing Chalk Wood.
- 6.10.29 The modelled deposition rates exceed the AQAL of $10 \text{ kg N ha}^{-1} \text{ y}^{-1}$ at all the modelled receptors. This is due to the large existing background. Under Environment Agency guidance⁶², because these receptors are of local importance only, the impacts of the Proposed Scheme can be classified as **not significant**.
- 6.10.30 A full table of results is given in **Appendix 6E** in **Volume 3: Figures and Appendices**.

Ecological effects: acid deposition

- 6.10.31 For acid deposition, the AQAL is the site-specific critical load function, which is different for each receptor, so results are usually expressed as percentages of the AQAL (i.e. the critical load function). Predicted acid deposition rates are found to increase by at most 1% of the AQAL at any of the modelled ecological receptors; this occurs at receptor E05 representing Winchill Wood. The greatest predicted total acid deposition rate at any of the modelled receptors is 128% of the AQAL at the same receptor.
- 6.10.32 The modelled deposition rates exceed the respective critical load function at all but two the modelled receptors. This is due to the large existing background. Under Environment Agency

guidance⁶², because these receptors are of local importance only, the impacts of the Proposed Scheme can be classified as **not significant**.

6.10.33 Full tables of results are given in **Appendix 6E** in **Volume 3: Figures and Appendices**.

Predicted effects and their significance

6.10.34 A summary of the results of the assessment of air quality is provided in **Table 6.19**.

Table 6.19 Summary of significance of effects

Receptor and summary of predicted effects	Significance	Summary rationale
Human health effects: annual mean NO ₂	Not significant	Impacts at all modelled receptors are negligible, in terms of the IAQM/EPUK guidance. There are no new or existing exceedances of the AQAL. Annual mean NO ₂ concentrations are less than 70% of the AQAL at all modelled receptors. Therefore, this impact is considered not significant.
Human health effects: hourly mean NO ₂	Not significant	Given that the annual mean NO ₂ concentrations are well below the 60 µg m ⁻³ value suggested by Defra as indicating that exceedances of the hourly mean limit are unlikely to occur, it is not considered credible that there is any risk of any exceedance of the hourly mean NO ₂ AQAL. Therefore, this impact is considered not significant.
Human health effects: annual mean PM ₁₀	Not significant	Annual mean PM ₁₀ concentrations are well below the AQAL and the impact of the Proposed Scheme is negligible at all receptors under the IAQM/EPUK criteria. Therefore, this impact is considered not significant.
Human health effects: daily mean PM ₁₀	Not significant	The daily mean PM ₁₀ is estimated to be greater than 50 µg m ⁻³ on no more than four days per year at any of the receptors. The AQAL specifies that there should be no more than 35 days per year greater than 50 µg m ⁻³ , so it is not considered that there is any risk of any exceedance of the daily mean PM ₁₀ AQAL. Therefore, this impact is considered not significant.
Human health effects: annual mean PM _{2.5}	Not significant	Annual mean PM _{2.5} concentrations are well below the AQO and the impact of the Proposed Scheme is negligible at all receptors under the IAQM/EPUK criteria. Concentrations are close to or above the WHO target at many receptors but the increase due to the Proposed Scheme is less than 1% of the target at all receptors. Therefore, this impact is considered not significant.
Ecological effects: annual mean NO _x	Not significant	Concentrations at some ancient woodland sites exceed the AQAL due to the existing background. However, under Environment Agency criteria, the impacts at all ecological receptors is considered not significant.
Ecological effects: nutrient nitrogen deposition	Not significant	All ecological sites modelled exceed the critical load for nutrient nitrogen deposition, due to the existing background. However, the additional contribution from the Proposed Scheme is small, and under Environment Agency criteria, the impacts at all ecological receptors is considered not significant.
Ecological effects: acid deposition	Not significant	All but two ecological receptors are modelled to exceed the critical load for acid deposition, due to existing background. However, the additional contribution from the Proposed Scheme is small, and under Environment Agency criteria, the impacts at all ecological sites is considered not significant.

6.11 Assessment of cumulative effects

- 6.11.1 As outlined in **Section 4.8**, consideration has been given as to whether any of the air quality receptors that have been taken forward for assessment in this chapter are likely to be subject to cumulative air quality effects because of air quality effects generated by other developments.
- 6.11.2 The assessment of air quality effects presented in **Section 6.10** shows that the impacts arising from the change in road traffic movements, and from the uplift to 19 mppa, would result in negligible effects on air quality. **No likely significant negative inter-project effects** are therefore predicted to occur from the Proposed Scheme together with 'other developments'. Similarly, **no likely significant intra-project effects** are predicted to arise from cumulative air quality interactions with the environmental aspects assessed within this ES. Therefore, **no likely significant cumulative air quality effects are predicted to occur**.

6.12 Conclusions of significance evaluation

- 6.12.1 Overall, the air quality impacts are considered to be **not significant**. All impacts on human receptors are classified as **negligible** in terms of the IAQM/EPUK guidance, and all impacts on ecological receptors are classified as **not significant** under Environment Agency guidance. Overall, the potential impacts of the proposed variation to Condition 8 (Passenger throughput cap) of the Proposed Scheme is considered **not significant**.

6.13 Implementation of environmental measures

- 6.13.1 No environmental measures specific to air quality are embedded within the Proposed Scheme.

7. Climate

7.1 Introduction

- 7.1.1 This chapter of the Environmental Statement (ES) assesses the likely significant effects of the Proposed Scheme with respect to climate. The chapter should be read in conjunction with the development description provided in **Chapter 3: Description of the Proposed Scheme** and with respect to relevant parts of other chapters for air quality (**Chapter 6: Air quality**) and transport (**Chapter 10: Transport**), where there is an overlap or relationship between the assessment of effects. This chapter presents a new assessment to fulfil the requirements of the 2017 EIA Regulations.
- 7.1.2 This chapter assesses the impact of the increase in Greenhouse Gas (GHG) emissions as a result of the Proposed Scheme on the global climate. It aims to identify the extent to which the magnitude of emissions associated with the 'with development' case (representative of a 19 mppa airport) compared to 'without development' case (representative of 18 mppa) affects the ability to meet national budgets and targets for climate change.
- 7.1.3 The growth to 19 mppa will be accommodated without any new on-airport infrastructure, including that which is already permitted and not yet built, and that which could be built under permitted development rights. The growth to 19 mppa would, therefore, not require any operational development and hence, emissions from construction activities are not considered in this assessment.

7.2 Limitations of this assessment

- 7.2.1 The limitations relating to the climate assessment for GHG emissions that affect the robustness of the assessment of the likely significant effects of the Proposed Scheme are:
- Carbon dioxide (CO₂) & carbon dioxide equivalent⁶⁴ (CO₂e) emissions have been calculated for different sources based on convention. Aviation emissions are by convention reported as CO₂ emissions (see **Section 7.9**). This reflects the uncertainties associated with non-CO₂ effects. All other emissions sources are reported in CO₂e. For aviation, since only CO₂ is reported with a global warming potential of one, 1 tonne of CO₂ is equal to 1 tonne of CO₂e and hence no conversion is needed to sum together these emission sources.
 - There is significant uncertainty around aviation policy with regards to climate change. Latest guidance has been used to inform the assessment approach and a sensitivity assessment is presented for international aviation emissions that considers a hypothetical reduced UK 2050 international aviation budget, based on recommendations from the Committee on Climate Change (CCC). This represents best practice at the time of submission.

7.3 Relevant legislation, planning policy, technical guidance

Legislative context

- 7.3.1 The following legislation is relevant to the assessment of the effects on climate receptors:

⁶⁴ Carbon dioxide equivalent (CO₂e) is a term for describing different greenhouse gases in a common unit. For any quantity and type of greenhouse gas, CO₂e represents the amount of CO₂ which would have the equivalent global warming impact.

- 7.3.2 The core legislation that is of relevance to this assessment is the Climate Change Act 2008⁶⁵, as amended in 2019. The Act now commits the Secretary of State to ensure that the net UK carbon account for the year 2050 is at least 100% lower than the 1990 baseline ('the UK carbon target'). The UK carbon target is now often referred to as 'net zero'. The Act also requires the Secretary of State to set successive five-year carbon budgets ('the UK carbon budgets') to meet the UK carbon target for 2050⁶⁶.
- 7.3.3 International aviation is not part of the 'net UK carbon account' and so is not included in the UK carbon target or the UK carbon budgets, but the UK carbon budgets are to be set 'having regard to' international aviation. In practice, the successive carbon budgets have been set allowing for 'headroom' for what is sometimes referred to as the 'planning assumption' (also referred to as the 'aviation target'). The 'planning assumption' that has been allowed for in all carbon budgets to date is 37.5Mt CO₂e⁶⁶. Thus, the latest (i.e. Fifth) carbon budget for the period to 2028-2030 is set at 1,765 Mt CO₂e (reflecting – that is excluding – a 'planning assumption' of 37.5Mt CO₂ for international aviation). This 'planning assumption' reflects the advice of the CCC in 'Meeting the UK aviation target – options for reducing emissions to 2050'⁶⁷.
- 7.3.4 In 2019 the CCC recommended to the Department for Transport (DfT) that international aviation (and shipping) are brought into the Sixth UK carbon budget⁶⁸. Recommendations from the CCC in setting the Sixth carbon budget were published on 09 December 2020⁶⁹. The Government must set the Sixth carbon budget in law by the end of June 2021.
- 7.3.5 The UK is part of the European Union (EU) Emissions Trading Scheme (ETS)⁷⁰, a cap-and-trade mechanism in which an allowance for annual carbon emissions from various sectors has been agreed at the EU level. The 2012 extension of EU ETS currently incorporates emissions from domestic aviation flights.
- 7.3.6 The Town and Country Planning (Environmental Impact Assessment) Regulations 2017⁷¹ require the consideration of climate change.

Planning policy context

- 7.3.7 A summary of the relevant planning policies is given in **Table 7.1**.

⁶⁵ The UK Government. (2008). Climate Change Act 2008. [online]. Available at: <http://www.legislation.gov.uk/ukpga/2008/27/contents> [Accessed 21 October 2020].

⁶⁶ The UK Government. (2016). Carbon Budgets. [online]. Available at: <https://www.gov.uk/guidance/carbon-budgets> [Accessed 21 October 2020].

⁶⁷ Committee on Climate Change. (2009). Meeting the UK aviation target – options for reducing emissions to 2050. [online]. Available at: <https://www.theccc.org.uk/wp-content/uploads/2009/12/CCC-Meeting-the-UK-Aviation-target-2009.pdf> [Accessed 21 October 2020].

⁶⁸ Committee on Climate Change (2019), "Letter: International aviation and shipping and net zero", [online]. Available at: <https://www.theccc.org.uk/wp-content/uploads/2019/09/Letter-from-Lord-Deben-to-Grant-Shapps-IAS.pdf> [Accessed 21 October 2020].

⁶⁹ Committee on Climate Change (2020), "The Sixth Carbon Budget: The UK's path to Net Zero". [online]. Available at: <https://www.theccc.org.uk/wp-content/uploads/2020/12/The-Sixth-Carbon-Budget-The-UKs-path-to-Net-Zero.pdf> [Accessed 14 December 2020].

⁷⁰ European Parliament and the Council of the European Union. (2003). Establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC (the EU Emissions Trading System. [online]. Available at: <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32003L0087&from=EN> [Accessed 21 October 2020].

⁷¹ The UK Government (2017). The Town and Country Planning (Environmental Impact Assessment) Regulations 2017 [online]. Available at: <https://www.legislation.gov.uk/uksi/2017/571/contents/made> [Accessed 4 November 2020].

Table 7.1 Planning policy issues relevant to climate

Reference	Policy issue
International planning policies	
The United Nations Framework Convention on Climate Change (UNFCCC) Paris Agreement ⁷²	The UNFCCC is the major international body responsible for managing climate change and carbon emissions. In 2015, it adopted the Paris Agreement, the aims of which are stated as: <i>"This Agreement, in enhancing the implementation of the Convention, including its objective, aims to strengthen the global response to the threat of climate change, in the context of sustainable development and efforts to eradicate poverty, including by: (a) Holding the increase in the global average temperature to well below 2 °C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5 °C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change; and (b) Increasing the ability to adapt to the adverse impacts of climate change and foster climate resilience and low greenhouse gas emissions development, in a manner that does not threaten food production"</i> . The agreement sets targets for countries' GHG emissions, but these are not legally binding or enforceable. The agreement excludes international aviation (but domestic aviation is included).
European Union (EU) Emissions Trading Scheme (ETS) ⁷⁰ and emerging UK ETS ⁷³	The UK Government are developing a mechanism to replace the EU ETS when the transition period of exiting the EU ends, as set out in the policy paper <i>'The future of UK carbon pricing'</i> . The final policy, to enter force in 2021, is expected to reduce the existing emissions cap by 5% compared to the current EU system. The proposed aviation routes include UK domestic flights, flights between the UK and Gibraltar, flights from the UK to EEA states, and flights from the UK to Switzerland.
National planning policies	
Aviation Policy Framework (APF) (DfT, 2013) ⁷⁴	<p>The APF presents the government's objective to <i>"ensure that the aviation sector makes a significant and cost-effective contribution towards reducing global emissions"</i>. This document postpones deciding on whether the UK should retain a national emissions target for aviation. It also sets out the need to better understand and manage the risks associated with climate change. This was deemed essential for the successful long-term resilience of the UK's aviation industry and its contribution to supporting economic growth and competitiveness.</p> <p>The APF set out the need for a national policy statement (NPS) for the case of any new national hub airport capacity, the Aviation NPS⁷⁵ (ANPS) was published in June 2018. However, on 27 February 2020 the Court of Appeal ruled that the ANPS was not produced as the law requires. The Government is required to review the ANPS to ensure that full regard is taken for The Paris Agreement⁷² and either withdraw, amend or leave the statement as it is. This review is ongoing.</p>
National Planning Policy Framework ⁷⁶ (NPPF)	<p>The NPPF acts as guidance for local planning authorities and decision-makers, both for developing plans and making decisions about planning applications.</p> <p>In Paragraph 148, the revised NPPF from 2019 states: <i>"The planning system should support the transition to a low carbon future in a changing climate... shape places in ways that contribute to radical reductions in greenhouse gas emissions... and support renewable and low carbon energy and associated infrastructure"</i>.</p> <p>It also requires, in Paragraph 150, that new development should be planned for in ways that <i>"can help to reduce greenhouse gas emission, such as through its location, orientation and</i></p>

⁷² UNFCCC. (2015). The Paris Agreement. [online]. Available at: <https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement>

⁷³ Welsh Government, The Scottish Government, Department of Agriculture, Environment and Rural Affairs (Northern Ireland), and Department for Business, Energy & Industrial Strategy. (2020). The future of UK carbon pricing. [online]. Available at: <https://www.gov.uk/government/consultations/the-future-of-uk-carbon-pricing> [Accessed 21 October 2020].

⁷⁴ Department for Transport (2013). Aviation Policy Framework. [online]. Available at: <https://www.gov.uk/government/publications/aviation-policy-framework>

⁷⁵ Department for Transport (2018). Aviation National Policy Statement. [online]. Available at: <https://www.gov.uk/government/publications/airports-national-policy-statement>

⁷⁶ Ministry of Housing, Communities and Local Government. (2019). National Planning Policy Framework (NPPF). [online]. Available at: <https://www.gov.uk/government/publications/national-planning-policy-framework--2#history> [Accessed 21 October 2020].

Reference	Policy issue
	<p><i>design. Any local requirements for the sustainability of buildings should reflect the Government's policy for national technical standards".</i></p> <p>Furthermore, in Paragraph 153, it is stated that local planning authorities should expect new development to: "a) comply with any development plan policies on local requirements for decentralised energy supply unless it can be demonstrated by the applicant, having regard to the type of development involved and its design, that this is not feasible or viable; and b) take account of landform, layout, building orientation, massing and landscaping to minimise energy consumption."</p>
The Ten Point Plan for a Green Industrial Revolution ⁷⁷	<p>This plan sets out the UK Government's approach to "build back better" following the impacts of the COVID-19 pandemic in 2020. It includes details of how the government intend to accelerate the path to net zero in line with the commitment made in the Climate Change Act (amended)⁶⁵. Included within the plan of relevance to this assessment is the accelerated shift to zero emission vehicles with a ban on sales of new petrol and diesel cars and vans from 2030, which is 10 years ahead of the previous target. The plan also includes commitments to take "steps to drive the uptake of sustainable aviation fuel, investment in R&D to develop zero-emission aircraft and developing the infrastructure of the future at our airports". Consultation on the Aviation Decarbonisation Strategy is planned for 2021.</p>
Development plan and local policies	
Luton Local Plan (2011 – 2031) ⁷⁸	<p>Strategic objective 1 of the Plan includes supporting "sustainable growth over the Plan period based on [London Luton Airport's] strategic importance." No definition of sustainable growth is given in this objective but other non-airport specific policies within the Plan capture what is meant by sustainable growth. The following policies are of relevance to the Proposed Scheme:</p> <ul style="list-style-type: none"> ● Policy LLP6 – London Luton Airport Strategic Allocation B: "(ii) they contribute to achieving national aviation policies; ... (iv) they fully assess the impacts of any increases 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; (viii) incorporate sustainable transportation and surface access measures that, in particular, minimise use of the private car, maximise the use of sustainable transport modes and seek to meet modal shift targets, all in accordance with the London Luton Airport Surface Access Strategy". ● Policy LLP25 – High quality design (vii): Proposals must show specific design criteria including provisions to "reduce carbon emissions, risk of flooding, and increase energy and water efficiency and quality". While the Proposed Scheme does not require any new infrastructure to be designed, the principals of this policy will be followed. ● Policy LLP37 – Climate change, carbon and waste reduction and sustainable energy: New developments are expected to "contribute towards mitigation, and adaptation to climate change through energy use reduction, efficiency, and renewable, and decentralised energy". While the Proposed Scheme does not require any new infrastructure to be designed, the principals of this policy will be followed.

⁷⁷ Th UK Government (2020). The Ten Point Plan for a Green Industrial Revolution [online]. Available: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/936567/10_POINT_PLAN_BOOKLET.pdf [Accessed 20 November 2020].

⁷⁸ Luton Borough Council. (2017). Luton Local Plan (2011 – 2031). [online]. Available at: <https://www.luton.gov.uk/Environment/Lists/LutonDocuments/PDF/Local%20Plan/adoption/Luton-Local-Plan-2011-2031-November-2017.pdf>

Local targets, budgets, and action plans

- 7.3.8 At a local level there are no binding GHG targets, although the Luton Borough Council Climate change action plan⁷⁹, published in 2019, sets out a commitment that Luton Borough will aim “for net zero carbon in advance of the national target in 2050”. Luton Borough Council has an aim for the borough to be carbon neutral by 2040. This strategy does not specifically mention aviation although London Luton Airport (LLA) is described as partner in some of the targets.
- 7.3.9 The Action Plan⁷⁹ suggests that a 2040 carbon neutral target for the borough is reasonably achievable, although it is acknowledged that the plan “does not describe how the borough as a whole will reach carbon neutrality” and a carbon reduction plan to achieve carbon neutrality for the whole borough it is not yet set out. As a result, for the purposes of this assessment, the non-aviation GHG emissions from the expansion of LLA are considered within the context of a 2040 carbon neutral Luton Borough, with an acknowledgement that the policy landscape may evolve significantly.
- 7.3.10 Emerging policies from the action plan⁷⁹ relating to GHG emissions at LLA include:
- Investigate introducing a workplace parking levy to secure investment in sustainable transport;
 - Investigate setting up a council PV company to install willing private properties; and
 - Investigate creating a local community carbon offsetting mechanism to channel funds for local energy efficiency measures.
- 7.3.11 Since this plan, further progress has been made on measuring current emissions across Luton and expanding the commitment to be a ‘carbon neutral town’ by 2040. The climate change action plan and the Local Plan⁷⁸ will be reviewed in the near future. It will consider exacting environmental standards for new developments by setting parameters for zero carbon development and providing significant improvements in air quality in the borough. In January 2020, Luton Borough Council set out in an executive report that it will work with London Luton Airport Operations Limited (LLAOL) to work towards net zero carbon by 2040 and published a climate change report as an evidence base of current GHG emissions⁸⁰.

Technical and other policy guidance

- 7.3.12 **Table 7.2** lists guidance documents which are relevant to the climate assessment.

Table 7.2 Technical guidance relevant to climate

Guidance	Relevance
Carbon Management Standards and Guidance	
<i>The Greenhouse Gas Protocol Corporate Accounting and Reporting Standard</i> (GHG Protocol) (WBCSD and WRI, 2014) ⁸¹	Provides standards and guidance for preparing a GHG emissions inventory.

⁷⁹ Luton Borough Council, (2019). Climate change action plan: Becoming a carbon neutral borough by 2040. Available at: <https://www.luton.gov.uk/Environment/Lists/LutonDocuments/PDF/Climate%20change/Climate-change-action-plan.pdf> [Accessed 25 November 2020].

⁸⁰ Luton Borough Council/Anthesis (2020). Climate Action Plan Support. [online] Available at https://www.anthesisgroup.com/wp-content/uploads/2020/03/Luton-Climate-Action-Plan-Support_FINAL_v2.pdf

⁸¹ World Business Council for Sustainable Development (WBCSD) and World Resources Institute (WRI) (2014). The Greenhouse Gas Protocol – A Corporate Accounting and Reporting Standard, March 2014, [online]. Available at: <http://www.ghgprotocol.org/sites/default/files/ghgp/standards/ghg-protocol-revised.pdf>

Guidance	Relevance
Publicly Available Standard (PAS) 2080: 2016 – <i>Carbon Management in Infrastructure</i> (BSI, 2016) ⁸²	Provides an approach to management of reduction of GHG emissions from infrastructure projects, working with stakeholders throughout the project lifecycle.
Institute of Environmental Management and Assessment (IEMA) Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance ⁸³	Current IEMA principles and guidance state that due to the combined environmental effect that is approaching a scientifically defined limit, any GHG emissions or reductions from a project might be considered to be significant. The IEMA guidance goes on to state that an Environmental Impact Assessment (EIA) should therefore ensure the project addresses their GHG emissions occurrence by taking mitigating action.
IEMA Principles Series: Climate Change Mitigation & EIA ⁸⁴	
BS EN ISO 14064-1 (BSI, 2019) ⁸⁵	ISO 14064-1 sets out guidance for quantification and reporting of greenhouse gas emissions and removals. The methodology for quantification of greenhouse gases follows this guidance and the stated guidance on reporting will be taken into account as part of this assessment.
Policy strategies and guidance	
<i>Clean Growth Strategy</i> ⁸⁶	<p>Provides the strategy for the UK's future clean growth to allow Carbon Budgets⁶⁶ to be met and support economic growth. The strategy sets out policies and targets out to 2050 for reducing GHG emissions across a number of sectors.</p> <p>The strategy focuses on accelerating clean growth, improving business and industry inefficiency, improving the energy efficiency of homes, rolling out low carbon heating, accelerating the shift to low carbon transport, delivering clean, smart, flexible power, enhancing the benefit and value of our natural resources and leading in the public sector and government.</p>
Committee on Climate Change, Net Zero. The UK's contribution to stopping global warming, 2019 ⁸⁷	<p>The report responds to a request from the UK governments to provide updated advice on the UK's long-term emission target, including the possibility of setting a "net-zero" target, following recent Intergovernmental Panel on Climate Change (IPCC) reports⁸⁸. The report suggests that the UK "should set and vigorously pursue an ambitious target to reduce greenhouse gas emissions (GHGs) to 'net-zero' by 2050".</p> <p>The report suggests strengthening aviation policies for both domestic and internationally agreed policies. The report also recognises the importance of Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA)⁸⁹ (see below for further information) and highlights that it will need to be based on robust rules that deliver genuine emission reduction.</p> <p>The UK Government has heeded the CCC advice and amended the target in the Climate Change Act 2008 to achieve net-zero⁶⁵. This target has therefore been adopted into UK Policy for domestic aviation and is considered in the climate assessment for London Luton Airport.</p>

⁸² British Standards Institution (BSI). (2016). *PAS 2080:2016. Carbon management in infrastructure*.

⁸³ IEMA. (2017). *Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance*. [online]. Available at:

<https://www.iema.net/assets/newbuild/documents/IEMA%20GHG%20in%20EIA%20Guidance%20Document%20V4.pdf>

⁸⁴ IEMA (2010). Climate Change Mitigation & EIA [online]. Available at: <https://www.iema.net/document-download/33006> [Accessed 21 October 2020]

⁸⁵ British Standards Institute. (2019). BS EN ISO 14064-1: 2019 Greenhouse gases. Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals.

⁸⁶ BEIS (2017). Clean Growth Strategy, [online]. Available at: <https://www.gov.uk/government/publications/clean-growth-strategy>

⁸⁷ Committee on Climate Change, (2019), "Net Zero: The UK's contribution to stopping global warming", [online]. Available at: <https://www.theccc.org.uk/wp-content/uploads/2019/05/Net-Zero-The-UKs-contribution-to-stopping-global-warming.pdf>

⁸⁸ IPCC (2018), "Special Report: Global Warming of 1.5°C", [online]. Available at <https://www.ipcc.ch/sr15/> [Accessed 21 October 2020].

⁸⁹ ICAO. (2016). Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA). [online]. Available at: <https://www.icao.int/environmental-protection/CORSIA/Pages/default.aspx> [Accessed 21 October 2020].

Guidance	Relevance
Decarbonising Transport: Setting the challenge ⁹⁰	The UK Government has begun the process of developing a plan to accelerate the decarbonisation of the transport sector. The Transport Decarbonisation Plan (TDP) is expected in Spring 2021. This initial document describes the challenges and potential policy proposals that will need to be developed to achieve a coordinated plan for decarbonising transport. It recognises airport expansion as a <i>"core part of boosting our global connectivity and levelling up across the UK"</i> . It stresses that <i>"action at an international level is the Government's preferred approach for addressing aviation's international carbon emissions"</i> . Further work is planned on developing the uptake of low carbon fuels in aviation. International aviation emissions from London Luton Airport will be considered against the planning assumption for aviation emissions as indicated by DfT in the Aviation 2050 Strategy ⁹¹ .
Committee on Climate Change: Reducing UK emissions 2020 Progress Report to Parliament ⁹³	This report sets out the UK's progress against emissions reduction targets to 2050. The Progress Report is updated annually. The report reiterates the previous recommendation that international aviation and shipping should be formally included in UK climate targets when the Sixth Carbon Budget is set (in December 2020).
Government's Response to the Committee on Climate Change's 2020 Progress Report to Parliament ⁹²	This document sets out the UK Government's response to the CCC's 2020 Progress Report ⁹³ and sets out policy recommendations for departments. The Government announced that it will publish a consultation on net zero aviation and that it is committed to negotiating in International Civil Aviation Organization (ICAO) for a long-term emissions reduction goal for international aviation that is consistent with the temperature goals of the Paris Agreement ⁷² . The Government also stated that it would be minded to include international aviation and shipping in UK carbon budgets if there is insufficient progress at international level. The Government also stressed that <i>"Airport expansion is a core part of boosting our global connectivity and levelling up across the UK"</i> .
The Sixth Carbon Budget: The UK's path to Net Zero⁶⁹	The CCC's recommendations for the Sixth Carbon Budget represent a world-leading commitment that will place the UK on a path to Net Zero by 2050 at the latest, with a trajectory that is consistent with the Paris Agreement. The recommendations require a reduction in UK GHG emissions of 78% by 2035 relative to 1990 which represents early action towards the commitment needed by 2050. International aviation and shipping is included within the budget although it is accepted that the sector itself will not be net zero and will require GHG removals. The Government must set the Sixth Carbon Budget in law by the end of June 2021. The CCC suggest that this must be followed by a set of policies and proposals that demonstrably would meet the budget. Suggested policies and proposals are recommended within the report.
Aviation GHGs guidance	
International Civil Aviation Organization (ICAO) Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) ⁸⁹	The ICAO is the delegated body for addressing requirements of the UNFCCC and the Paris Agreement ⁷² with regards to aviation. One hundred and ninety-one Member States agreed in 2016 to introduce a global market-based emissions offsetting scheme, known as CORSIA. The UK Government is a member of ICAO and signed up to CORSIA. The aim of CORSIA is to achieve carbon-neutral growth in aviation emissions from 2020 onwards. It relies on offsetting and emission reductions through the use of technological and operational improvements, and sustainable aviation fuels. CORSIA will be implemented in three phases: a pilot phase (from 2021 to 2023), the first phase (2024 to 2026) and the second phase (2027 to 2035). The pilot and first phase are voluntary whereas the second phase applies to all ICAO Member States. By 2035 90% of international aviation activity will come under the scheme.

⁹⁰ Department for Transport (2020). Decarbonising Transport: Setting the Challenge. [online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/876251/decarbonising-transport-setting-the-challenge.pdf

⁹¹ The UK Government. (2018). Aviation 2050: The future of UK aviation. A consultation. [online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/769695/aviation-2050-web.pdf [Accessed 21 October 2020].

⁹² The UK Government, (2020), Government response to the Committee on Climate Change 2020 progress report to Parliament: reducing UK emissions. [online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/928005/government-response-to-ccc-progress-report-2020.pdf [Accessed 17 November 2020].

⁹³ Committee on Climate Change. (2020). Reducing UK emissions: 2020 Progress Report to Parliament, [online]. Available at: <https://www.theccc.org.uk/publication/reducing-uk-emissions-2020-progress-report-to-parliament/> [Accessed 21 October 2020].

Guidance	Relevance
	<p>CORSIA is based on comparing the total CO₂ emissions for a year (from 2021 onwards) against a baseline level of CO₂ emissions, which was originally defined as the average of CO₂ emissions from international aviation covered by the CORSIA for the years 2019 and 2020. Considering the impact of COVID-19 on the aviation sector, the Council agreed that 2019 emissions shall be used for 2020 emissions in the pilot phase⁹⁴.</p> <p>All operators with annual emissions greater than 10,000 tonnes of CO₂ are required to report their emissions on an annual basis, with monitoring starting from 1 January 2019 (international flights only). Offsetting requirements will apply from 2021. London Luton Airport is committed to the implementation of CORSIA to stabilise net carbon emissions from flights.</p>
UK Aviation Forecasts (2017) ⁹⁵	<p>The DfT's UK Aviation Forecasts includes a capacity of 18 mppa for London Luton Airport but recognises that this will be reached in the near future. In Paragraph 7.24 it states that <i>"Luton is expected to reach its 18mppa planning cap soon after 2020, so the relief from congestion after extra capacity is provided around 2017 is short-lived"</i>. London Luton Airport CO₂ emissions are stated as a baseline (2016) of 1.0 MtCO₂ although the DfT forecasts this to decrease to a maximum of 0.7 MtCO₂ in the 2050s.</p>
The European Monitoring and Evaluation Programme (EMEP) / European Environment Agency (EEA) Guidebook ⁹⁶	<p>The Guidebook provides guidance and data for the calculation of aviation emissions over the cruise and Landing and Take Off (LTO) phases. The EEA and the United Nations' Long-Range Transboundary Air Pollution (LRTAP) project produce the guidebook to support the compilation of greenhouse gas inventories across Europe and across market sectors. The aviation chapter of the guidebook recommends methodologies for calculating CO₂ emissions from aviation, with various 'tiers' or levels of accuracy. The Tier 3A approach shall be used by the assessment since it provides the highest level of accuracy and is consistent with the forecast data available for the development.</p>
London Luton Airport Vision for Sustainable Growth 2020-2050 ⁹⁷	<p>This report is produced by London Luton Airport Ltd (LLAL), the landowners of London Luton airport. They recognise that London Luton Airport <i>"has a significant influence over factors that contribute to it, such as: emissions from aircraft; vehicle trips; and those associated with the activities of other companies operating at the airport."</i> It commits LLAL to developing a comprehensive strategy to reduce carbon emissions where possible prior to future expansion work.</p>
Aviation 2050: The Future of UK Aviation ⁹⁸	<p>The Aviation 2050 strategy was under consultation from December 2018 to June 2019. It was published prior to the CCC's Net Zero recommendation⁹⁷ and the subsequent update to the Climate Change Act⁶⁵. While the response from the Government is expected imminently, it does not yet represent adopted policy. Nevertheless, the consultation documents state the government's intention to <i>"leave 'headroom' for international aviation when setting carbon budgets so that the economy as a whole is on a trajectory to meeting the 2050 Climate Change Act target (including international aviation). To set a clear level of ambition for the sector, the government proposes to: accept the CCC's recommendation that emissions from UK departing flights should be at or below 2005 levels in 2050 [37.5 MtCO₂]."</i> Such consideration has therefore been applied to the climate assessment of the Proposed Scheme at London Luton Airport.</p> <p>Since the development of the Aviation Strategy, the consultation document <i>"the future of UK aviation: making best use of existing runways"</i>⁹⁸ has been produced which sets out how UK</p>

⁹⁴ ICAO. (2020). CORSIA and COVID-19. [online]. Available at: <https://www.icao.int/environmental-protection/CORSIA/Pages/CORSIA-and-Covid-19.aspx> [Accessed 21 October 2020].

⁹⁵ Department for Transport (2017). UK aviation forecasts, [online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/781281/uk-aviation-forecasts-2017.pdf

⁹⁶ European Environment Agency (2017). Emission Factor Database and EMEP/EEA air pollutant emission inventory guidebook – 2016, [online]. Available at: <https://www.eea.europa.eu/publications/emep-eea-guidebook-2016/emission-factors-database>

⁹⁷ London Luton Airport Ltd., (2017), "London Luton Airport Vision for Sustainable Growth 2020-2050", [online]. Available at [https://www.luton.gov.uk/Council government and democracy/Lists/LutonDocuments/PDF/CPC/19-London-Luton-Airport-Vision-for-sustainable-growth-2020-50.pdf](https://www.luton.gov.uk/Council%20government%20and%20democracy/Lists/LutonDocuments/PDF/CPC/19-London-Luton-Airport-Vision-for-sustainable-growth-2020-50.pdf)

⁹⁸ HM Government (2018). Beyond the horizon: The future of UK aviation. Making best use of existing runways. [online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/714069/making-best-use-of-existing-runways.pdf [Accessed 21 October 2020].

Guidance	Relevance
	<p>carbon budgets can be met whilst increasing passenger numbers at airports other than Heathrow (based on the 37.5 MtCO₂ recommended target).</p> <p>The Aviation Strategy will be considered as part of the Net Zero Aviation Consultation due in Autumn 2020⁹².</p>
Committee on Climate Change Letter on International aviation and shipping and net zero ⁶⁸	<p>This 2019 letter responds to the Government's request for advice on bringing international aviation and shipping (IAS) emissions formally within the net-zero target. For international aviation, the CCC advice a primary policy approach of international framing while still setting domestic targets. It is recognised that "Zero-carbon aviation is highly unlikely to be feasible by 2050" yet reduced emissions are suggested through "a combination of fuel efficiency improvements, limited use of sustainable biofuels, and by managing demand growth". It is acknowledged that the use of GHG removal offsets (e.g. CORSIA) will be essential for reducing emissions in the IAS sectors. The letter sets a target for aviation emissions in 2050 of 30 MtCO₂ although this is assumed to be superseded by the CCC's recommendation in the Sixth Carbon Budget report⁶⁹.</p> <p>IAS emissions have not legally been brought within the UK carbon budgets, however international aviation emission from London Luton Airport are contextualised in the climate assessment.</p>
Sustainable Aviation Carbon Road-Map: A path to Net Zero ⁹⁹	<p>Sustainable Aviation is a group of UK airlines, airports, aerospace manufacturers and air navigation service providers which aim to set out a collective and long-term strategy to ensure a sustainable future for UK aviation. In 2020, the group published Sustainable Aviation Carbon Road-Map: A path to Net Zero. This report sets out how the UK "can accommodate a 70% growth in passengers by 2050 whilst reducing net carbon emissions levels from just over 30 million tonnes of CO₂ year down to zero through smarter flight operations, new aircraft and engine technology, modernising our airspace, the use of sustainable aviation fuels and significant investment in carbon reductions through smart market-based policy measures". London Luton Airport is aligned to the goals of Sustainable Aviation and actively involved in achieving the road-map.</p>
International scientific reports	
Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (AR5): Synthesis Report ¹⁰⁰	<p>The Fifth Assessment Report (AR5) from the IPCC was published in 2014 and provides robust evidence that "human influence on the climate system is clear". It stresses the long-term risk associated with future increases in greenhouse gas emissions that "will cause further warming and long-lasting changes in all components of the climate system, increasing the likelihood of severe, pervasive and irreversible impacts for people and ecosystems". The IPCC report underpins the international response in terms of international agreements and carbon budgets as "substantial emissions reductions over the next few decades can reduce climate risks in the 21st century and beyond". These factors are used to contextualise the GHG emissions created by the Proposed Scheme. The sixth report (AR6) is expected in June 2022.</p>
Intergovernmental Panel on Climate Change (IPCC) Special Report (SR15): Synthesis Report, 2018 ⁸⁸	<p>In 2018, the IPCC released a special report on the climate change impacts of a temperature increase of 1.5°C above pre-industrial levels which is likely to be reached "between 2030 and 2052 if [the trend] continues to increase at the current rate. (high confidence)". The purpose of this report was to strengthen the global response to the threat of climate change. In response to this report, the UK Government requested their advisors, the CCC, to review the UK's Climate Change Act target. Following the CCC's advice⁸⁷ the UK Government subsequently amended the target in May 2019⁶⁵. This revised target has been used in the context of this assessment.</p>
Local Guidance	
Luton Borough Council, Climate Action Plan Support ⁸⁰	<p>This evidence base produced by Anthesis for Luton Borough Council was used to provide an evidence base to inform the Council's Climate Action Plan (published January 2020)⁷⁹. It focuses</p>

⁹⁹ Sustainable Aviation (2020). Sustainable Aviation Carbon Road-Map: A path to Net Zero. Available online at: https://www.sustainableaviation.co.uk/wp-content/uploads/2020/02/SustainableAviation_CarbonReport_20200203.pdf [Accessed 21 October 2020].

¹⁰⁰ IPCC (2014), "AR5 Synthesis Report – Climate Change", [online]. Available at: https://www.ipcc.ch/site/assets/uploads/2018/02/SYR_AR5_FINAL_full.pdf

Guidance	Relevance
	on analysis of current emissions from the council and large businesses in Luton (including London Luton Airport) and determining future emission pathways. It aims to inform the proportion of emissions that can be influenced locally without the action of regional or national actors.

Overview of current aviation policy landscape

- 7.3.13 As detailed above, the Climate Change Act⁶⁵ requires the Secretary of State to ensure the net UK carbon account is 100% below the 1990 baseline by 2050; in other words, 'net zero'. This target does not include emissions from international aviation, which are taken into account through the mechanism of leaving 'headroom' in UK carbon budgets and are to be tackled through International Civil Aviation Organization (ICAO), following the approach adopted in the United Nations Framework Convention on Climate Change (UNFCCC) Kyoto Protocol¹⁰¹.
- 7.3.14 Whilst zero-carbon aviation may be challenging by 2050, the UK is supporting international efforts through ICAO to achieve 'net zero' (i.e. a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases). In the consultation paper '*Aviation 2050: the future of UK aviation*'⁹¹, published prior to the CCC's net zero recommendation⁸⁷ and the subsequent update to the Climate Change Act⁶⁵, the Government seeks GHG emissions reductions from international aviation to be achieved through measures such as efficiency improvements and sustainable aviation fuels. Remaining emissions are then required to be offset through mechanisms such as emissions trading and the ICAO 'Carbon Offsetting and Reduction Scheme for International Aviation' (CORSIA)⁸⁹.
- 7.3.15 In its Response to the CCC's 2020 Progress Report to Parliament (October 2020)⁹² the Government has announced that it will publish a consultation on net 'zero' aviation. The Government's approach to tackling aviation's GHG emissions consistent with the UK carbon target is expected to be set out in the forthcoming Aviation Strategy which will be considered as part of the Net Zero Aviation Consultation due in Autumn 2020. Additionally, the government is committed to negotiating in the ICAO for a long-term emissions reduction goal for international aviation that is consistent with the temperature goals of the Paris Agreement⁷². The Government also stated that it would be minded to include international aviation and shipping in UK carbon budgets if there is insufficient progress at international level.
- 7.3.16 The consultation document "*The future of UK aviation: making best use of existing runways*"⁹⁸ sets out that airport expansions under 10 million passengers per annum (mppa) should be considered at a Local Planning Authority level and take into account that the overall approach to reducing aviation GHG emissions from the UK is a matter to be tackled at a national level through the forthcoming Aviation Strategy which will be considered as part of the Net Zero Aviation Consultation due in Autumn 2020⁹².
- 7.3.17 In their recommendations to Government on setting the Sixth Carbon Budget, the CCC's Balanced Pathway scenario for achieving net zero by 2050 keeps GHG emissions from the aviation sector (including domestic, international, and military aviation) to 23 MtCO₂e in 2050. This figure has not, however, been adopted by Government as a new 'planning assumption' for setting future UK carbon budgets and so has not been considered as the core metric for contextualisation of GHG emissions from the Proposed Scheme in this assessment.
- 7.3.18 Given that there is no existing policy that endorses the 23 MtCO₂e CCC suggestion, the previous CCC recommendation of 37.5 MtCO₂⁶⁶ remains the Government's planning assumption for

¹⁰¹ United Nations (1998). Kyoto Protocol to the United Nations Framework Convention on Climate Change. [online]. Available at: <https://unfccc.int/resource/docs/convkp/kpeng.pdf> [accessed 17 November 2020].

understanding the future of the UK aviation industry in 2050 and the Government has proposed in the Aviation 2050 consultation document that it should be accepted⁸⁹. It is not known at this stage whether a lower planning assumption may be adopted at some time in the future. This is because the details of the route and specific mechanisms to reaching net zero across the UK economy in 2050 are not yet set out (it may be that other sectors are required to decarbonise further to accommodate aviation, for example). The 23 MtCO_{2e} suggestion is therefore only considered for sensitivity testing at this stage. The policy landscape may be updated in the upcoming Aviation Strategy consultation and/or through the legislation of the sixth carbon budget (both due in 2021).

7.3.19

For the purposes of this assessment, the following assumptions about the future of the aviation sector and how that relates to this assessment are considered:

- 37.5 MtCO₂ from international aviation departing the UK in 2050 is the 'planning assumption' used by the UK Government in setting current UK carbon budgets⁶⁶ under the Climate Change Act⁶⁵ and it remains the most appropriate value for against which to consider the international aviation GHG emissions from the Proposed Scheme. It is supported by the statement in Aviation 2050⁹¹ that the UK Government proposes to accept the CCC's previous recommendation that GHG emissions from UK departing flights should be at or below 2005 levels in 2050 (37.5 MtCO₂).
- 23 MtCO_{2e} from the UK aviation sector represents the 'Balanced Pathway scenario for the aviation sector to contribute towards the UK goal of achieving 'net zero' in 2050, as described by the CCC⁶⁹. It should therefore be adopted as a 'sensitivity test' value against which to consider the aviation GHG emissions from the Proposed Scheme. This CCC Balanced Pathway suggestion is representative of what aviation policy *could* look like in the future to take into account the amended Climate Change Act⁶⁵.
- Achieving net zero in the aviation sector would require increased sustainable fuel use, greenhouse gas removals/offsets and operational improvements, which will be driven by international sector-based mechanisms such as European Union Emissions Trading Scheme (EU ETS)⁷⁰ and CORSIA⁸⁹. Robust and CORSIA-eligible offsetting opportunities in the UK, including substantial investment in Carbon Capture and Storage (CCS), are required to increase the extent of carbon removal in the UK.
- National and international-level responses to reducing aviation GHG emissions that have been put in place (e.g. Aviation Strategy, CORSIA) will be effective.
- All GHG emissions associated with the operation of LLA that are not from international aviation are considered within the context of the UK carbon target for 2050⁶⁴ and UK carbon budgets⁶⁵. This includes domestic aviation.
- Surface access and all Scope 1 and 2 GHG emissions are also relevant to local carbon targets and plans as set by Luton Borough Council.

7.4 Data gathering methodology

Study area

7.4.1

GHG emission sources have been considered for operational activities associated with the Proposed Scheme. This includes the GHG emissions resulting from activities within the application site (e.g. buildings and airside operations) and activities outside of the application site that are emitted as a direct result of the Proposed Scheme (e.g. aviation emissions and surface access emissions). There are no construction activities associated with the Proposed Scheme.

- 7.4.2 The receptor for each GHG emissions source is the global climate. Given the global impacts of climate change and the globally-recognised requirement to limit GHG emissions to maintain global average temperature increase below 2°C, as laid out in the Paris Agreement⁷², the receptor is considered highly sensitive to emissions. GHG emissions to the receptor are considered direct and negative, and the effects on the receptor are permanent.
- 7.4.3 Given the only receptor for GHG emissions is the global climate, the study area of the emissions from the Proposed Scheme is effectively the Earth system.

Desk study

- 7.4.4 A summary of the organisations that have supplied data, together with the nature of that data is as follows:
- Department for Business, Energy, and Industrial Strategy (BEIS);
 - ▶ Emissions factors for traffic and transport emissions and airport building and ground operation emissions have been sourced from the BEIS Greenhouse gas reporting conversion factors 2019¹⁰²;
 - ▶ BEIS 2019 Energy and Emissions Projections (EEP)¹⁰³ are used in the development of the future scenarios for electricity mix, and
 - ▶ BEIS national statistics of GHG emissions 1990 - 2018¹⁰⁴
 - DfT:
 - ▶ Factors for the proportion of cars, taxis and other diesel, petrol and electric vehicles were sourced from the latest version of the DfT's TAG Data Book¹⁰⁵, reporting up to 2050.
 - ▶ Factors for the fuel efficiency of petrol, diesel and electric use in road vehicles, and diesel and electric use for rail transport were sourced from the latest version of the DfT's TAG Data Book¹⁰⁵, reporting up to 2050.
 - ▶ Information relating to future scenarios for the implementation of sustainable aviation fuel (SAF) use was sourced from DfT's UK Aviation Forecasts 2017⁹⁵.
 - ▶ Information on average occupancy of vehicles and average commuting distance were taken from the National Travel Survey 2019¹⁰⁶.
 - National Grid:
 - ▶ Data has been sourced from the National Grid Future Energy Scenarios (FES) 2020¹⁰⁷ on the proportion electric vehicles and electricity demand for electric vehicles, reporting up to 2050.

¹⁰² BEIS (2019), Greenhouse gas reporting: conversion factors 2019 [online]. Available at <https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2019> [Accessed 21 October 2020].

¹⁰³ BEIS (2020), Updated energy and emissions projections: 2019 [online]. Available at <https://www.gov.uk/government/publications/updated-energy-and-emissions-projections-2019> [Accessed 12 November 2020].

¹⁰⁴ BEIS (2020), Final UK greenhouse gas emissions national statistics: 1990 to 2018 [online]. Available at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/875508/final-greenhouse-gas-emissions-tables-2018.xlsx [Accessed 25 November 2020].

¹⁰⁵ Department for Transport (2020), TAG Data Book. Available at <https://www.gov.uk/government/publications/tag-data-book> [Accessed 21 October 2020].

¹⁰⁶ Department for Transport, (2018), "National Travel Survey: 2019", [online]. Available at: <https://www.gov.uk/government/statistics/national-travel-survey-2019>

¹⁰⁷ National Grid (2020), Future Energy Scenarios, FES 2020. Available at <https://www.nationalgrideso.com/future-energy/future-energy-scenarios/fes-2020-documents> [Accessed 21 October 2020].

- Office of Road and Rail (ORR):
 - ▶ Emissions for rail passenger transport have been sourced from the ORR annual data tables for rail emissions up to the period 2019-2020¹⁰⁸.
- CCC:
 - ▶ Advice on the future uptake of sustainable aviation fuels and aircraft efficiency has been sourced from historical CCC reports^{67, 109, 110} and guidance provided in letters to the Secretary of State for Transport¹¹¹.
 - ▶ Advice on future aviation policy requirements in order to achieve a 'Balanced Pathway' to net zero including aircraft efficiencies and increased ambition relating to uptake of sustainable aviation fuels⁶⁹.
- Sustainable Aviation:
 - ▶ Emissions factors associated with improvements in air traffic management and operational practices has been sourced from the Sustainable Aviation Roadmap⁹⁹.
 - ▶ Information relating to the prospective use of sustainable aviation fuels and improvements in aircraft efficiency has been sourced from the Sustainable Aviation Roadmap⁹⁹.
- European Monitoring and Evaluation Programme (EMEP) / European Environment Agency (EEA):
 - ▶ The EMEP/EEA Emission Factor Database⁹⁶ has been used as one of the main sources of data for aviation emissions associated with the Proposed Scheme.
- International Civil Aviation Organisation (ICAO) Aircraft Engine Emissions:
 - ▶ The ICAO *Aircraft Engine Emissions Databank*¹¹² has been used as one of the main sources of data for aviation emissions associated with the Proposed Scheme.
- UK Civil Aviation Authority (CAA) Passenger Survey Report 2019¹¹³ has been used to determine the origin/destination of terminating passengers. A representative distance has then been determined between the regions of the UK and LLA. This is based on average travel distance (km) by road or rail from major cities or stations within the region. Modal splits for 2019 passenger travel are based on raw data of last mode of transport provided to London Luton Airport Operations Limited (LLAOL) by CAA in summer 2020.
- LLAOL:
 - ▶ Staff Travel Survey 2019 conducted by Systra on behalf of LLAOL;

¹⁰⁸ ORR (2020), Table 6100 - Estimates of normalised passenger and freight carbon dioxide equivalent (CO_{2e}) emissions. Available at <https://dataportal.orr.gov.uk/statistics/infrastructure-and-emissions/rail-emissions/> [Accessed 17 November 2020].

¹⁰⁹ Committee on Climate Change (2018), Biomass in a low-carbon economy, Committee on Climate Change Nov 2018. Available at <https://d423d1558e1d71897434.b-cdn.net/wp-content/uploads/2018/11/Biomass-in-a-low-carbon-economy-CCC-2018.pdf>

¹¹⁰ Committee on Climate Change (2012), Aviation – Fact Sheet. Available at <https://www.theccc.org.uk/wp-content/uploads/2013/04/Aviation-factsheet.pdf>

¹¹¹ Committee on Climate Change (2019), "Letter: Aviation 2050 – The future of UK aviation", [online]. Available at <https://www.theccc.org.uk/wp-content/uploads/2019/02/Aviation-Letter-from-Lord-Deben-to-Chris-Grayling.pdf>

¹¹² ICAO (2017). ICAO Aircraft Engine Emissions Databank, [online]. Available at: <https://www.easa.europa.eu/easa-and-you/environment/icao-aircraft-engine-emissions-databank>

¹¹³ CAA. (2020). 2019 Passenger survey report [online]. Available at: <https://www.caa.co.uk/Data-and-analysis/UK-aviation-market/Consumer-research/Departing-passenger-survey/2019-Passenger-survey-report/>

- ▶ London Luton Annual Monitoring Report 2019¹¹⁴ was used to determine staff working patterns;
- ▶ Employee number forecast based on increased number of passengers;
- ▶ Scope 1 and 2 GHG emissions and non-aviation Scope 3 emissions for diesel usages in third party vehicles from the 2019 Carbon Footprint Report¹¹⁵.

- 7.4.5 The assessment is based on the data sources described above and has been provided in Appendix 7A, including:
- Airport building and ground operation GHG emissions at LLA have been provided using corporate reporting data from 2019 and internal LLAOL data;
 - Surface access forecasts, including modal split targets for passenger trips and employee trips as detailed in the Travel Plan (Chapter 10: Transport);
 - Air Traffic Movement forecast for future scenarios including Landing and Take-Off (LTO) and climb, cruise and descent (CCD) phase forecast emissions of the Proposed Scheme.

Survey work

- 7.4.6 No survey work has been necessary specifically for the assessment of greenhouse gases, but the results of the traffic surveys described in the Transport Assessment (**Chapter 10: Transport**) have been used in the assessment in this chapter.

7.5 Overall baseline

Current baseline

- 7.5.1 2019 baseline emissions are presented in **Table 7.3**. These emissions represent the most up-to-date information available for GHG emissions at LLA.

Table 7.3 GHG emissions/year for the 2019 baseline

Source	Activity	2019 (baseline) (ktCO ₂ e / yr*)
Aviation	International aviation	1,033.83 ktCO ₂ / yr
	Domestic aviation	41.86 ktCO ₂ / yr
Surface access	Passengers	396.06
	Employees	9.69
Airport buildings and ground operations	Grid electricity	10.10
	Gas usage	1.5

¹¹⁴ London Luton Airport (2019). Annual Monitoring Report 2019. [online] Available at: <https://www.caa.co.uk/Data-and-analysis/UK-aviation-market/Consumer-research/Departing-passenger-survey/2019-Passenger-survey-report/> [Accessed 04 November 2020].

¹¹⁵ London Luton Airport (2020). LLA Carbon Footprint Report Jan 2020. [online]. Available at: <https://www.london-luton.co.uk/CMSPages/GetFile.aspx?guid=50af686c-ffae-49fd-981d-180f588dd5d6> [Accessed 04 November 2020].

Source	Activity	2019 (baseline) (ktCO ₂ e / yr*)
	Diesel (heating)	0.10
	Diesel (power)	0.10
	Diesel (vehicles LLAOL)	1.08
	Diesel (vehicles third party)	0.67
	Refrigerants	0.27
Total		1,495.26

* emissions are quoted in units ktCO₂e / yr unless otherwise stated for aviation emissions which are reported in ktCO₂/yr.

- 7.5.2 The most up-to-date statistics for aviation emissions from the UK as a whole are from 2018. International aviation emissions are 36.3 MtCO₂, and 36.7 MtCO₂¹⁰⁴. Estimates for 2019 aviation emissions from the UK as a whole suggest a 1.7% increase in international aviation emissions 37.3 MtCO₂e and sector emissions (spanning domestic, international, and military aviation) of 39.63 MtCO₂e⁶⁹.

Future baseline

- 7.5.3 The 'without development' case is representative of an 18 mppa airport and therefore is used to define the future baseline. Comparison of the 'with development' case (i.e. the proposed 19 mppa airport) are presented in **Section 7.10**.
- 7.5.4 To represent projected market and policy trends, improvement factors for carbon emission reductions in the future have been embedded into the GHG assessment. The future baseline has therefore been calculated under three future emission scenarios (upper, central, and lower emission scenarios). Full details of this process and method are described **Section 7.9** and **Appendix 7A**.
- 7.5.5 As a representation of the future baseline, emissions from the 'without development' central emission scenario are shown in **Table 7.4**. Given the above it should be noted that the future baseline is variable under different emission scenarios and the relevant assessment has been used for comparison with the 'with development' case in **Section 7.10**. Equivalent representations for future baseline under the upper and lower emission scenarios are described in **Appendix 7A**.

Table 7.4 GHG emissions/year for the 18 mppa future baseline in the 'without development' case for the central emission scenario.

Source	Activity	2024 (ktCO ₂ e / yr*)	2028 (ktCO ₂ e / yr*)	2032 (ktCO ₂ e / yr*)	2040 (ktCO ₂ e / yr*)	2050 (ktCO ₂ e / yr*)
Aviation	International aviation	992.96 ktCO ₂ /yr	941.00 ktCO ₂ /yr	871.36 ktCO ₂ /yr	863.38 ktCO ₂ /yr	723.69 ktCO ₂ /yr
	Domestic aviation	38.51 ktCO ₂ /yr	37.57 ktCO ₂ /yr	34.61 ktCO ₂ /yr	34.29 ktCO ₂ /yr	28.74 ktCO ₂ /yr
	Passengers	279.55	251.80	224.69	137.78	71.21

Source	Activity	2024 (ktCO ₂ e / yr*)	2028 (ktCO ₂ e / yr*)	2032 (ktCO ₂ e / yr*)	2040 (ktCO ₂ e / yr*)	2050 (ktCO ₂ e / yr*)
Surface access	Employees	8.57	7.73	6.95	4.30	2.28
Airport buildings and ground operations	Grid electricity	8.22	4.38	4.01	3.21	3.21
	Gas usage	1.50	1.50	1.50	1.50	1.50
	Diesel (heating)	0.10	0.10	0.10	0.10	0.10
	Diesel (power)	0.10	0.10	0.10	0.10	0.10
	Diesel (vehicles LLAOL)	1.08	1.08	1.08	1.08	1.08
	Diesel (vehicles third party)	0.67	0.67	0.67	0.67	0.67
	Refrigerants	0.27	0.27	0.27	0.27	0.27
Total		1,331.53	1,246.20	1,145.34	1,046.67	832.84

* emissions are quoted in units ktCO₂e/yr unless otherwise stated for aviation emissions which are reported in ktCO₂/yr.

A location-based approach has been used to calculate GHG emissions according to the GHG Protocol.

Aviation forecasts are provided up to 2032 and are then assumed to remain constant. Surface access targets are included up to 2024 and then are assumed to remain constant.

7.6 Consultation

7.6.1 **Table 7.5** provides an overview of climate issues that were raised during the non-statutory consultation, identifies how the EIA has had regard to those issues, and where further information can be found in this chapter.

Table 7.5 Overview of issues raised during non-statutory consultation regarding climate change

Issue raised	Consultee	Response and how considered in this chapter	Section Ref
Respondents proposed that the airport should endeavour to reduce its impact on climate change and to meet net-zero targets through reductions in passengers and movements, limiting operations to aircraft with the lowest carbon emissions, and that profits be invested to combat climate change and meeting international and national policies and targets.	Various	<p>The assessment has identified the impact of the increase in GHG emissions from the Proposed Scheme on the global climate. It identifies the extent to which the magnitude of emissions associated with the 19 mppa airport, compared to the existing 18 mppa airport affects the ability to meet national budgets and targets for climate change.</p> <p>LLAOL has since 2019 implemented differential charging to the airlines to incentivise the rapid modernisation of fleet to help reduce emissions.</p>	Section 7.9

7.7 Scope of the assessment

Spatial scope

- 7.7.1 The receptor for all emissions is the global climate.
- 7.7.2 For the purposes of this climate assessment, emissions have been split into three sources¹¹⁶:
- Aviation (domestic and international), including:
 - ▶ Climb, cruise and descent (CCD) phase constituting climb from 3,000 ft (914m), cruise and descent to 3,000 ft; and
 - ▶ Landing and Take Off (LTO) cycle which accounts for aviation movements below 3,000 ft.
 - Surface access (staff and passengers); and
 - Airport buildings and operations, including:
 - ▶ Energy and on-site use including Scope 1 (gas use, diesel for fleet vehicles, heating/red diesel, and refrigerants);
 - ▶ Scope 2 (grid electricity) emissions; and
 - ▶ Scope 3 (other indirect emissions) from third party diesel usage for vehicles.
- 7.7.3 Emissions from non-aviation operations are under the control by the owner/operator during the operation phases of the Proposed Scheme. LLAOL monitors its Scope 1 and 2 GHG emissions and reports them annually in the publicly available Carbon Footprint Report¹¹⁵.
- 7.7.4 LLAOL has strong influence over surface access emissions, for example through the development of the Travel Plan and investments in infrastructure such as the Direct Air-Rail Transit (DART)¹¹⁷.
- 7.7.5 LLAOL has limited influence over aviation emissions, the reduction of which are predominantly driven by international mechanisms such as CORSIA⁸⁹.

Temporal scope

- 7.7.6 The temporal scope of the GHG assessment has been increased to consider quantifications of GHG emissions up to 2050. This takes account of airport operations up to the date of the UK Government's net zero target, as defined in the Climate Change Act 2008 (as amended)⁶⁵. There are no construction activities associated with the Proposed Scheme.
- 7.7.7 Forecasts for GHG emissions in the 'with development' case (i.e. a 19 mppa airport) are compared to forecasts for GHG emissions in the 'without development' case (i.e. an 18 mppa airport). In each case, forecasts are produced for the following assessment years:
- 2024 – the year at which the proposed planning capacity of 19 mppa is forecasted to be reached;

¹¹⁶ Note that the usual Scope 1, 2 and 3 system of GHG reporting is not applied, as the contextualisation of emissions in the assessment blurs the boundaries between the three scopes. For example, there are different contextualisation approaches for each of international aviation emissions, domestic aviation emissions, surface access emissions and water consumption, even though they are all scope 3 emissions.

¹¹⁷ London Luton Airport. Direct Air-Rail Transit (DART). [online]. Available at: <https://dart.llal.org.uk/>

- 2028 – the year to which the proposed noise contour condition is suggested;
- 2032 – a representative year at which airline transition to “next generation” aircraft should be complete based on current technologies available and commitments made;
- 2040 – the time period that aligns with the local policy aim for a carbon neutral Luton Borough; and
- 2050 – the year of the UK Government’s legislative net zero target⁶⁵.

7.7.8 Due to the long-lived nature of CO₂ in the global atmosphere, the effect of GHG emissions on the receptor are treated as permanent.

Potential receptors

7.7.9 The receptor for each GHG emissions source is the global climate. Given the global impacts of climate change and the globally-recognised requirement to limit GHG emissions to maintain global average temperature increase below 2°C, as laid out in the Paris Agreement⁷², the receptor is considered highly sensitive to emissions. GHG emissions to the receptor are considered direct and negative, and the effects on the receptor are permanent.

Likely significant effects

7.7.10 The likely significant climate change effects that will be taken forward for assessment in the ES are summarised in **Table 7.6**.

Table 7.6 Likely significant climate change effects

Activity	Effect	Receptor
GHG emissions associated with the Proposed Scheme (aviation emissions, surface access and airport building and ground operations)	The cumulative GHG emissions over the design life of the Proposed Scheme will be contextualised against relevant climate targets, aims and budgets. Increases (decreases) to emissions to the global climate receptor are considered direct, negative (positive) and permanent in all cases.	Global climate

7.8 Environmental measures embedded into the development proposals

- 7.8.1 This section outlines the embedded measures committed to as part of the 19 mppa application and how these embedded measures have influenced the climate assessment.
- 7.8.2 Some mitigations have been developed for the purposes of the expansion (e.g. the Travel Plan, see **Chapter 10: Transport**) while others are ongoing independent of expansion (e.g. Scope 1 and 2 improvements). The aviation forecasts have been produced specifically for the purposes of understanding the impacts of expansion and constitute realistic forecasts of future aircraft movements based on commercial arrangements with airlines which are constantly evolving.
- 7.8.3 The mitigations embedded into the assessment provide a reasonable projection of the airport operations in 2024, 2028, and 2032. However, it should be noted that there is always a high degree of uncertainty in such a forecast. No additional mitigations are included beyond this date.

Airport building and ground operation emissions

- 7.8.4 LLAOL is committed to reducing emissions within their control. LLAOL achieved Level 1 'Mapping' certification within the Airport Carbon Accreditation (ACA) Scheme in March 2020 and aim to achieve further Level 2 'Reduction' and Level 3 "Optimisation" in the future.
- 7.8.5 LLAOL has implemented a number of measures to reduce emissions which are captured in the 2019 baseline. These include the following measures as described in London Luton Airport Carbon Footprint Report 2020¹¹⁵:
- Installation of air handling unit upgrades saving over 1.3 million kWh per year;
 - Upgrading boilers, reducing gas consumption by 16%; and
 - Installation of LED lighting, reducing electricity demand by over 1 million kWh per year.
- 7.8.6 LLAOL has set commitments to further reduce emissions which are set out in the Responsible Business Strategy 2020-2025¹¹⁸ and are captured in the assessment under the relevant future time period scenarios:
- Sourcing all electricity from renewable sources by the end of 2021;
 - Generating at least 25% of electricity demand from on-site renewables by 2026; and
 - Reducing operational electricity demand (excluding vehicles) to less than 2.0 kWh/pax by end of 2023.

Surface access emissions

- 7.8.7 The Travel Plan (**Chapter 10: Transport**) sets out objectives and targets with a series of measures around the promotion of walking, cycling, use of public transport and reducing single car occupancy for both passengers and staff under the 'with development' case. Of specific note to the climate assessment, the following targets are quantified within the assessment of the 'with development' case:
- Passengers travelling to and from the airport by rail will increase to 25% in the 19 mppa scenario by 2024;
 - Passengers travelling to and from the airport by bus/coach will increase to 17% in the 19 mppa scenario by 2024;
 - Staff travelling to and from the airport by rail will increase to 10% in the 19 mppa scenario by 2024; and
 - Staff travelling to and from the airport by bus will increase to 17% in the 19 mppa scenario by 2024.
- 7.8.8 These targets are driven through a number of projects and actions, described in the Travel Plan Action Plan (**Chapter 10: Transport**) including:
- Incorporate secure cycle parking facilities within the design of all buildings within the site. Ensure cycle storage facilities are well lit, secure and offer protection from the weather;
 - Promotion and marketing of DART upon launch;

¹¹⁸ London Luton Airport (2020). Responsible Business Strategy 2020-2025 [online]. Available at: <https://www.london-luton.co.uk/CMSPages/GetFile.aspx?guid=eb79ca97-d37c-4803-9f89-c4965a466814> [Accessed 04 November 2020].

- By continuing to promote local bus and coach travel and build upon previous attempts to promote the Luton Dunstable Busway;
- By continuing to promote the Staff Discount Travel Card; and
- By ensuring the provision of live travel information and timetables for staff and passengers for bus stops and train times.

- 7.8.9 A full list of actions can be found in the Action Plan contained within the Travel Plan (**Chapter 10: Transport**).
- 7.8.10 The improved surface access targets described in paragraph 7.8.7 are reflected in the 'with development' case from 2024 onwards. As there are no commitments beyond 2024, no further reductions in emissions is applied. Additional targets within the Travel Plan that cannot be quantified are not embedded within the quantification of GHG emissions and so are considered as additional mitigation (see **Section 7.13**).
- 7.8.11 Surface access targets within the 'without development' case are based on targets within the 2019 ASAS re-issue¹¹⁹.
- 7.8.12 LLAOL will continue to monitor, report and review targets through the Surface Access Strategy monitoring process.

7.9 Assessment methodology

Overall approach

- 7.9.1 The generic project-wide approach to the assessment methodology is set out in **Chapter 4**, and specifically in **Sections 4.6 to 4.8**. However, whilst this has informed the approach that has been used in this climate assessment, it is necessary to set out how this methodology has been applied, and adapted as appropriate, to address the specific needs of this climate assessment.
- 7.9.2 The overall approach to quantifying GHG emissions associated with the Proposed Scheme is to forecast the relevant GHG emissions sources for the 'with development' case (i.e. the 19 mppa planning capacity case) and the 'without development' case (i.e. the 18 mppa future baseline case) in 2024, 2028, 2032, 2040, and 2050. The GHG emissions sources are:
- Aviation;
 - Surface access; and
 - Airport buildings and operations.
- 7.9.3 The detailed methodology for quantifying each GHG emissions source can be found in **Appendix 7A in Volume 3: Figures and appendices**.
- 7.9.4 Emission factors for carbon emission reductions in the future, have been embedded into the GHG emissions calculations in the following areas:
- Vehicle splits by fuel type (petrol, diesel, and electric vehicles) for cars, taxis and LGV;
 - Vehicle efficiency improvements for cars, taxis, buses and coaches, and rail;
 - UK grid electricity generation efficiency improvements;

¹¹⁹ London Luton Airport (2019). LLAOL Airport Surface Access Strategy 2019 Reissue [online]. Available at: <https://www.london-luton.co.uk/CMSPages/GetFile.aspx?guid=a31129aa-284b-4b4c-aae0-ed0208d70fec> [Accessed 04 November 2020].

- Air traffic management and operation improvements;
- Aircraft and engine efficiencies (only included beyond 2040)
- Sustainable aviation fuel (only included in 2050 in line with current projections available).

7.9.5 A range of scenarios are presented to reflect the uncertainties in the projections:

- **Upper emission scenario:** This scenario assumes a relatively small amount of GHG emissions reductions in the areas listed above, and thus represents a conservative projection;
- **Central emission scenario:** This scenario aligns with current or anticipated policy and market trends in the majority of areas listed above. In some cases, a central point between the upper and lower scenario is used; and
- **Lower emission scenario:** this scenario assumes more substantial improvements in GHG emissions reductions in the areas listed above, and thus represents an optimistic projection.

7.9.6 The Government's Ten Point Plan for a green industrial revolution⁷⁷ (released 18 November 2020) includes a commitment to bring forward the date at which sales of new petrol and diesel cars will be banned to 2030. Government and industry modelling of vehicle fuel splits under future scenarios have not yet been updated to reflect this new target. The scenario used in this assessment are therefore considered conservative in all cases. For example, the most ambitious scenario considered for the lower emission scenario is based on the National Grid Future Energy Scenarios (FES)¹⁰⁷ Leading the Way scenario which has an assumption that the sale of new petrol, diesel and hybrid cars and vans is ended from 2032.

7.9.7 The Ten Point Plan⁷⁷ also includes statements to support the uptake of sustainable aviation fuels and zero-emission aircraft. Further details of these measures will be consulted on in the Aviation Decarbonisation Strategy in 2021 and have therefore not been included in the assessment.

7.9.8 Achieving the aviation sector target of 23 MtCO₂e/yr in 2050 in the CCC's 'Balanced Pathway' scenario requires policy implementation. Policy recommendations have been given by in the Sixth Carbon Budget report and have been used to create a fourth future scenario for the sensitivity assessment. This is shown alongside the upper, central, and lower emission scenarios in this sensitivity assessment and details are provided in **Appendix 7A in Volume 3: Figures and appendices**.

Consideration of non-CO₂ aviation emissions

7.9.9 CO₂ makes up around 99% of the Kyoto Protocol¹⁰¹ GHG emissions associated with aviation, with the other 1% coming from Nitrous Oxide (N₂O). The combustion of fuel by aircraft also results in emissions of water vapour, nitrogen oxides (NO_x) and aerosols; furthermore, at altitude, condensation can result in the formation of linear ice clouds (contrails) and lead to further aviation-induced cloudiness; these are sometimes referred to as non-CO₂ effects. Recent research into the impacts of non-CO₂ effects has suggested that they could be up to three times that associated with CO₂ emissions alone¹²⁰.

7.9.10 While there is a high confidence level in CO₂ emissions from aviation sources, non-CO₂ effects are associated with much greater uncertainty. The confidence level has been based on a combination of evidence (limited, medium, robust) and agreement (low, medium, and high). Confidence is low for contrail cirrus, low for emissions of nitrogen oxides, medium for water vapour emissions in the stratosphere (including soot and sulphur emissions) and very low for aerosol-cloud interactions. As

¹²⁰ Lee et al., (2020), "The contribution of global aviation to anthropogenic climate forcing for 2000 to 2018", *Atmospheric Environment*, 244 (117834), DOI: 10.1016/j.atmosenv.2020.117834

such, these aviation emission sources remain areas of active climate change research and policy discussion.

- 7.9.11 The state of scientific knowledge on non-CO₂ effects is deemed too uncertain for accurate measurement at this stage and there is no consensus on: how such emissions should be measured; the metric against which to express an impact; or the significance of such an impact.
- 7.9.12 As such, non-CO₂ effects for aviation are not currently included in any domestic or international legislation or emission targets, including the Paris Agreement⁷². The relevant expert body, the CCC, had advised that the appropriate approach at a domestic level was *"not to assess or include the impact of non-CO₂ effects, given the significant scientific uncertainty surrounding their scale"*. The CCC has subsequently advised the UK Government that consideration should be given on *"how best to tackle [non-CO₂ effects] alongside UK climate targets"*⁹³, although this remains outstanding.
- 7.9.13 The Government has indicated that the net zero aviation consultation will provide information on the latest evidence on non-CO₂ effects. They previously stated that the UK will work through ICAO on measures to regulate aircraft non-CO₂ effects, expecting ICAO to issue best practice guidance on mitigations for non-CO₂ effects^{92,91}.
- 7.9.14 While it is acknowledged that non-CO₂ effects may well have a climate impact, they have not been considered in this assessment. This is on the basis that the impacts could not be adequately quantified due to the level of scientific uncertainty, and in any case, they cannot be contextualised given that there is no international framework for considering them and current policy and emission targets do not include them.

Methodology for assessing overall effect of GHG emissions associated with the Proposed Scheme

- 7.9.15 Current Institute of Environmental Management and Assessment (IEMA) principles and guidance^{83,84} states that due to the combined environmental effect that they have, any GHG emissions (either positive or negative) from a project might be considered to be significant. Therefore, the assessment methodology aims to determine the relative scale of the impact of the Proposed Scheme on global climate change by considering the sensitivity (or value) of the receptor, its impacts, and the magnitude of that impact on relevant carbon budgets and targets at a national and local level.

Sensitivity

- 7.9.16 The only receptor for the climate assessment is the global climate. The global climate is the largest inter-related cumulative environmental effect⁸³, so the receptor can be considered highly sensitive.

Magnitude

- 7.9.17 To identify the relative magnitude of GHG emissions of a single project on the receptor (i.e. the global climate), an approach for contextualisation must be used.
- 7.9.18 The magnitude of the Proposed Scheme has been evaluated against the following two criteria:

1) The extent to which the scheme materially affects the ability of the UK to meet the aviation 'planning assumption':

The scale of international aviation GHG emissions in the 'with development' case is contextualised within the current UK 'planning assumption' for international aviation of 37.5 MtCO₂⁶⁶. The CCC

'Balanced Pathway' value for GHG emissions from the aviation sector of 23 MtCO_{2e}⁶⁹, which is not current Government policy, is also considered as a sensitivity assessment¹²¹.

2) The extent to which the scheme affects the ability of the UK to meet its target and budgets:

The scale of the GHG emissions from all sources except international aviation in the 'with development' case is contextualised within their overall impact on the UK Government's UK carbon target of 'net zero' in 2050⁶⁵ and UK carbon budgets⁶⁶. The scale of the GHG emissions from all sources except aviation in the 'with development' case is also considered within context of local objectives for reducing GHG emissions. Therefore, the extent to which the scheme affects the ability of Luton Borough Council to meet its climate change objectives for a carbon neutral borough by 2040⁷⁹ is taken into account. However, as the local objectives are not yet part of local planning policy, they are not given the same weight as the national Net Zero target and the associated budgets.

7.9.19 The magnitude of the GHG emissions from the Proposed Scheme is determined based on **Table 7.7**.

Table 7.7 Magnitude criteria

Magnitude	Magnitude criteria
High (adverse)	Net increases in GHG emissions associated with the Proposed Scheme are considered to materially affect the ability of the UK Government to meet their carbon budgets/targets.
Low (adverse)	Net increases in GHG emissions associated with the Proposed Scheme are considered to not materially affect the ability of the UK Government to meet their carbon budgets/targets.
Negligible	GHG emissions associated with the Proposed Scheme are approximately neutral compared to the without development case, and thus there is no implication for carbon budgets/targets.
High (beneficial)¹²²	Net decreases in GHG emissions associated with the Proposed Scheme are considered to materially affect the ability of the UK Government to meet their carbon budgets/targets.

Determination of effect

7.9.20 Given that the sensitivity of the receptor (i.e. the global climate) is always high, there will be a residual adverse or beneficial effect of the project on the global climate depending on the relative levels of the 'with development' and 'without development' cases. The extent of that effect is assessed as described in **Table 7.8**.

¹²¹ The CCC recommendation for the aviation sector is based on CO₂, CH₄ and N₂O emissions. Given the planning assumption is based on CO₂ emissions only, aviation emissions from LLA have been assessed as CO₂ emissions only. The sensitivity is therefore an under-estimation of total GHG emissions contributing towards the recommended target.

¹²² Note that any reduction in GHG emissions compared to the 'without development' case are considered to have a high beneficial magnitude, so there is no low magnitude.

Table 7.8 Determination of effect matrix

Magnitude	Effect
Negligible	None
Low	Minor
High	Major

7.9.21 In EIA terms, a minor adverse effect is considered not significant, while a major adverse effect is considered significant.

7.10 Quantification of GHG emissions

7.10.1 This section summarises the predicted GHG emissions in the 'with development' case where 19 mppa is reached in 2024. Emissions are compared relative to the 2019 baseline, to show the increase in emissions from all operations at LLA. Emissions are also compared relative to the 'without development' case, where the capacity of 18 mppa remains, to show emissions associated with the Proposed Scheme only.

7.10.2 The information in this section is used to inform the assessment effects in **Section 7.11**.

Total emissions

7.10.3 Projected GHG emissions for the baseline case, 'without development' and 'with development' cases for the assessment years 2024, 2028, 2032, 2040 and 2050 in three future scenarios (upper emission, central emission, and lower emission scenarios) are shown in **Table 7.9**.

Table 7.9 Total GHG emissions (ktCO_{2e}/yr) in the 2019 baseline, 'without development' and 'with development' cases in the upper, central and lower emission scenarios.

		2024		2028		2032		2040		2050	
	2019 baseline*	Without development	With development	Without development	With development	Without development	With development	Without development	With development	Without development	With development
Upper emission scenario		1339.87	1425.47	1265.16	1307.46	1180.24	1266.23	1159.33	1239.89	1048.59	1121.95
Central emission scenario	1495.26	1331.53	1416.73	1246.20	1287.15	1145.34	1226.06	1046.67	1101.98	832.84	865.26
Lower emission scenario		1317.13	1400.22	1208.07	1241.85	1059.00	1119.59	936.42	967.40	734.90	754.69

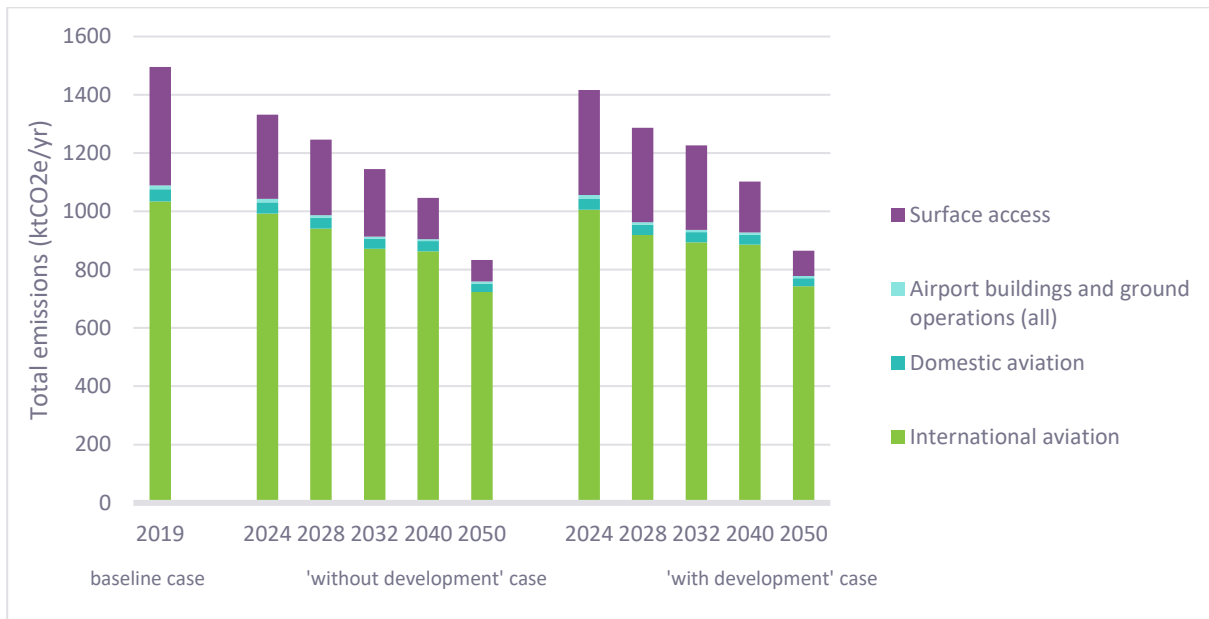
Total emissions cover all aviation emissions (domestic and international), surface access emissions (passengers and employees), and airport building and ground operation.

Note a location-based approach has been used to determine emissions from electricity procurement.

7.10.4

A breakdown of total projected GHG emissions by source for the central emission scenario are shown in **Figure 7.1**. This illustrates the overall GHGs associated with LLA in the 2019 baseline, 'without development' and 'with development' cases. Equivalent representations for the upper and lower emission scenarios are shown in **Appendix 7A** in **Volume 3: Figures and appendices**. A summary of the results is provided below.

Figure 7.1 Total GHG emissions for the 2019 baseline, the 'without development' and 'with development' cases for the central scenario.



Note: Aviation emissions are by convention reported as CO₂ emissions¹²³. This reflects the uncertainties associated with non-CO₂ emissions (see **Section 7.9**). All other emissions sources are reported in CO_{2e} which is defined as the sum of all GHG emissions multiplied by their global warming potential. For aviation, since only CO₂ is reported with a global warming potential of one, 1 tonne of CO₂ is equal to 1 tonne of CO_{2e} and hence no conversion is needed to sum together these emission sources.

Note a location-based approach has been used to determine emissions from electricity procurement.

7.10.5

Relative to the 2019 baseline, total GHG emissions in the 'with development' case decrease in all future scenarios.

7.10.6

In 2050, total GHG emissions in the 'with development' case are below 2019 baseline values in all scenarios. In 2050, total GHG emissions from the 'with development' case are 373.3 – 740.6 ktCO_{2e}/yr lower than the 2019 baseline case, representing a 25 – 50% reduction in total GHG emissions relative to the 2019 baseline.

7.10.7

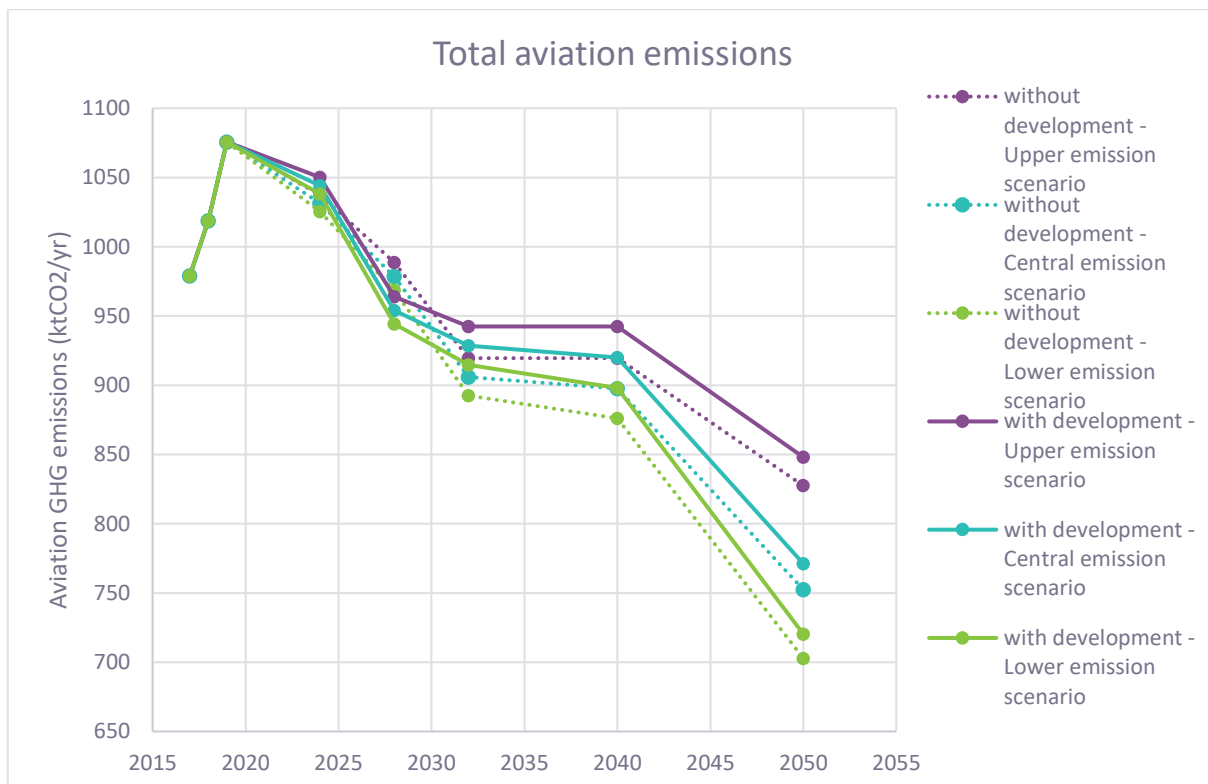
GHG emissions in the 'with development' case peak in the 2024 assessment year in all future scenarios. This is primarily due to fact that passenger forecasts for the Proposed Scheme are assumed to be constant beyond 2024 while efficiency improvements (see **Section 7.9**) continue. At their peak in 2024, total GHG emissions associated with the 'with development' case are 69.8 – 95 ktCO_{2e}/yr lower compared to the 2019 baseline, dependent on the future scenario considered.

¹²³ ICAO (2010), ICAO Environment Report, Chapter 1, Aviation's Contribution to Climate Change [online]. Available at: https://www.icao.int/environmental-protection/Documents/EnvironmentReport-2010/ICAO_EnvReport10-Ch1_en.pdf [Accessed 21 October 2020].

Aviation emissions

7.10.8 Total projected aviation GHG emissions from LLA for the 2019 baseline, 'without development' and 'with development' cases for the assessment years 2024, 2028, 2032, 2040 and 2050 in the three future scenarios (upper, central, and lower emission scenarios) are shown in **Figure 7.2** (see **Appendix 7A** in **Volume 3: Figures and appendices** for associated data, including splits for domestic and international aviation). 'Latest generation' aircraft, including Airbus NEO and Boeing MAX classes, are included in the aircraft forecasts. Note that no 'next generation' aircraft beyond the current Airbus NEO and Boeing MAX classes are considered in the aircraft forecasts.

Figure 7.2 Total aviation GHG emission forecasts for the 'with development' and 'without development' cases in all scenarios



7.10.1 Relative to the 2019 baseline, aviation GHG emissions in the 'with development' case are lower in all scenarios for all assessment years. This is because in both the 'with development' and 'without development' cases the fleet composition includes the latest generation of aircraft.

7.10.9 In 2050, total aviation GHG emissions in the 'with development' case are 720.4 – 848.1 ktCO₂/yr, a decrease of 227.6 – 355.3 ktCO₂/yr (equivalent to a 21 – 33% decrease in total aviation GHG emissions), relative to the 2019 baseline conditions.

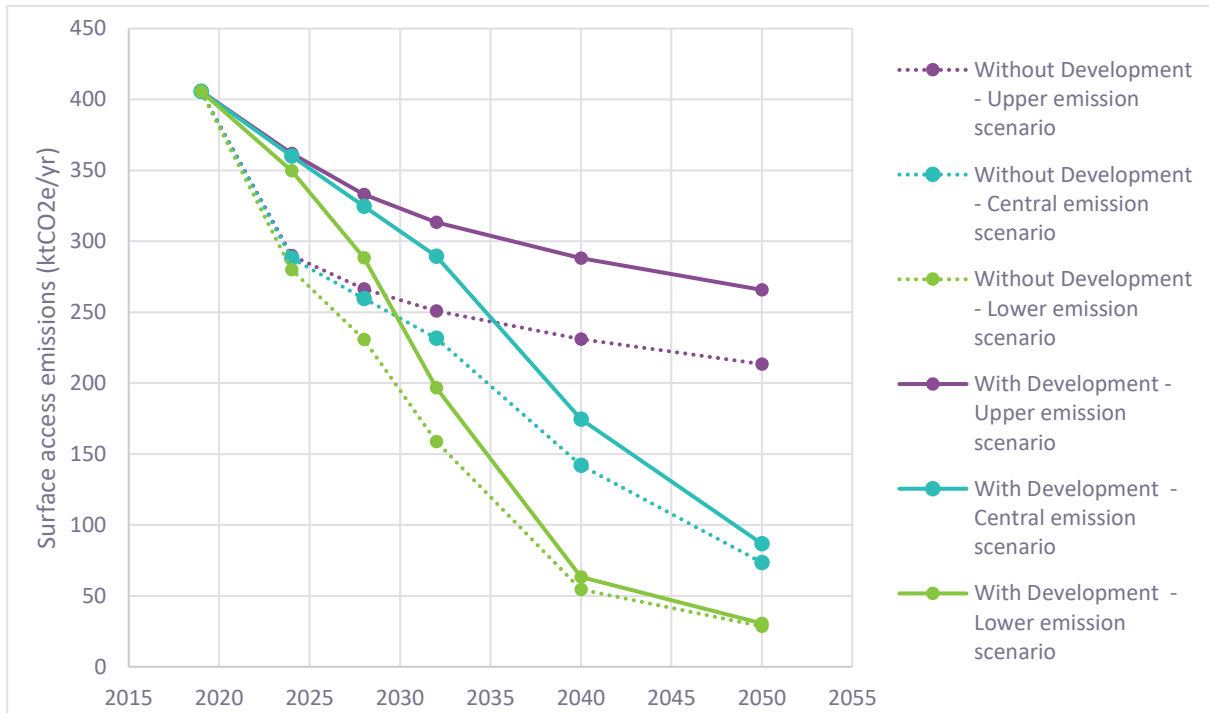
7.10.10 The transition to the latest generation of aircraft occurs more rapidly in the 'with development' case than the 'without development' case. This is as a result of increased capacity encouraging airlines to consolidate the newer, larger, aircraft into their fleet at London Luton Airport. Therefore, GHG emissions from the 'with development' case are lower than the 'without development' case in 2028. By 2032, the transition to the latest generation of aircraft has taken hold in the 'without development' case, meaning the emissions are lower than the 'with development' case.

7.10.2 The further reductions in GHG emissions through to 2050, which benefit both the 'with development' and 'without development' cases, are based on assumed further efficiencies due to future next generation aircraft (from 2040) and the introduction of sustainable aviation fuels.

Surface access emissions

7.10.11 Projected surface access GHG emissions for the 2019 baseline, 'without development' and 'with development' cases for the assessment years 2024, 2028, 2032, 2040 and 2050 in three future scenarios (upper emission, central emission, and lower emission scenarios) are shown in **Figure 7.3**.

Figure 7.3 Surface access GHG emission forecasts (passenger and staff) for the 'without development' case (dashed line) and 'with development' cases (solid line) in all future improvement emission scenarios.



7.10.12 Surface access GHG emissions associated with the 'with development' case, relative to the 2019 baseline, describes the impact of future surface access activities by passengers and staff at LLA, including the surface access emissions associated with the Proposed Scheme.

7.10.13 Relative to the 2019 baseline, surface access GHG emissions in the 'with development' case decrease in all future scenarios. This is due to improved public transport targets, anticipated market trends regarding uptake of electric vehicles and efficiency improvements in transport modes (see **Section 7.9**) that have been embedded into the GHG assessment.

7.10.14 In 2050, surface access GHG emissions in the 'with development' case are reduced compared to the 2019 baseline value in all future improvement emissions scenarios. In 2050, surface access GHG emissions from the 'with development' case are 30.6 – 265.7 ktCO_{2e}/yr. This represents a 140.0 – 375.2 ktCO_{2e}/yr reduction relative to the 2019 baseline, equivalent to a 35% - 92% reduction in surface access GHG emissions. The difference between the scenarios is due to the relative lack of low/zero carbon cars in the upper emissions scenario.

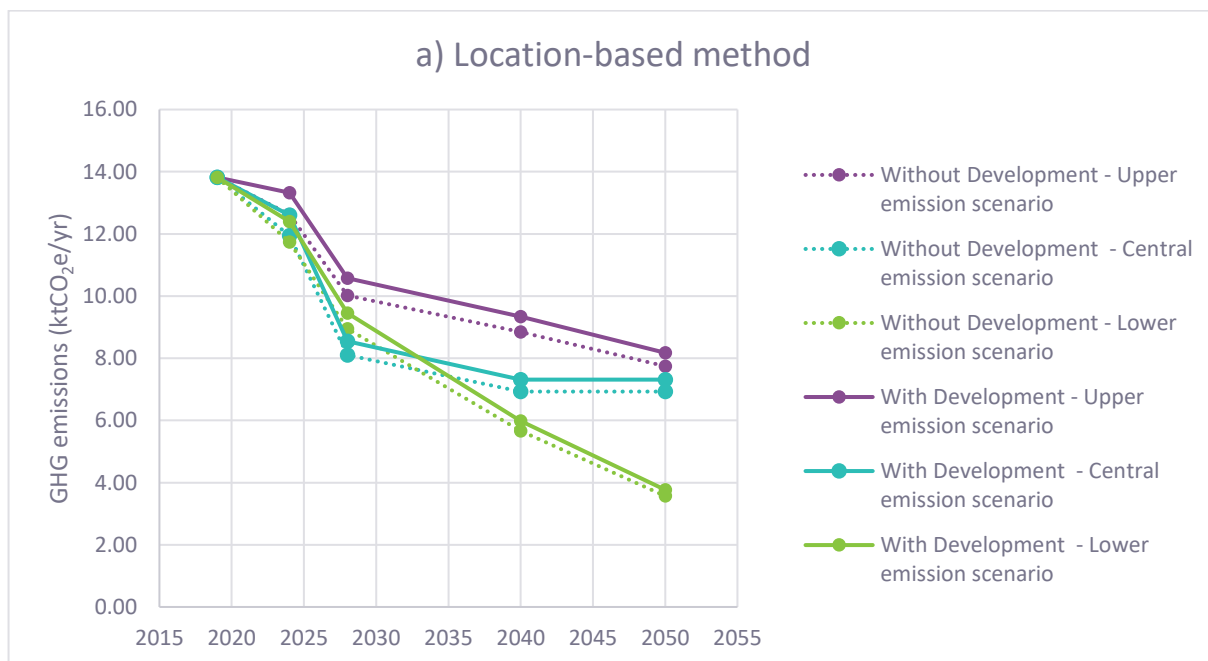
7.10.15 The reduction in surface access GHG emissions is primarily driven by increases in electric vehicle usage, and fuel efficiency improvements in vehicles and rail travel. Additionally, the embedded surface access measures regarding uptake of public transport methods have been included where possible.

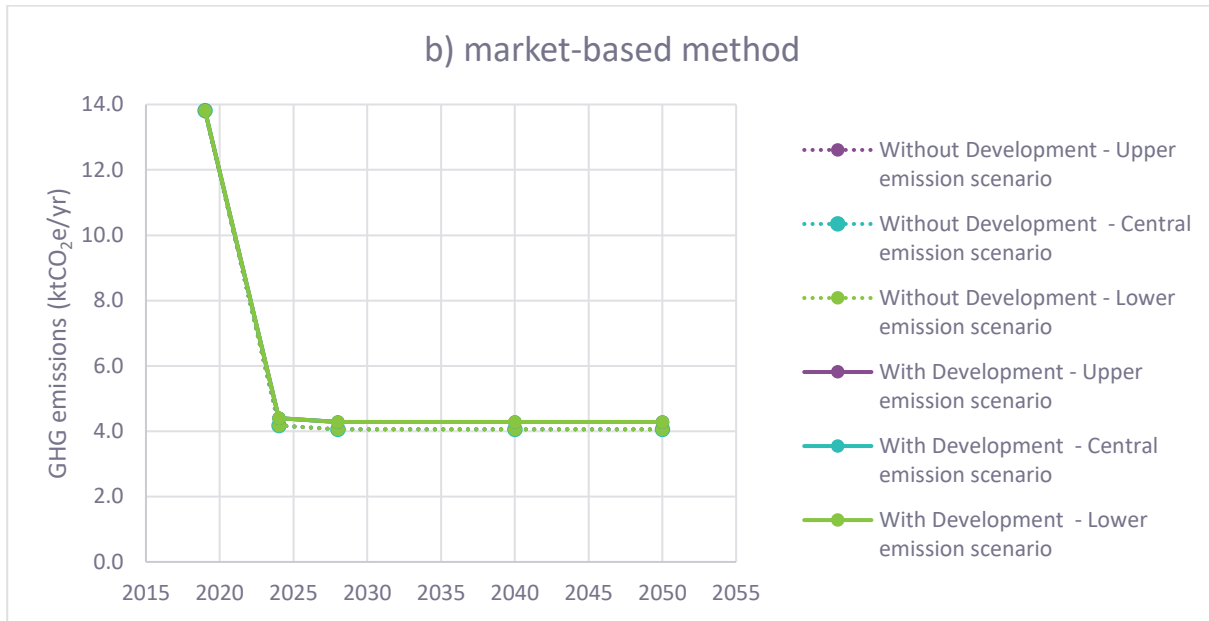
- 7.10.16 Modal shifts to increased public transport share are modelled until 2024, which is for when the targets in the Travel Plan are set. Further reductions in future years would also be expected, so the GHG emissions presented for 2028, 2032, 2040 and 2050 are likely to be conservative.

Airport buildings and ground operations

- 7.10.17 In line with the GHG protocol⁸¹ and BEIS guidance¹⁰², and as described in **Appendix 7A** in **Volume 3: Figures and appendices**, both location-based and market-based carbon reporting methods have been used to calculate projected GHG emissions associated with Scope 2 electricity (**Figure 7.4**). Baseline and projected airport building and ground operation GHG emissions are shown in **Figure 7.4**. Data is available in **Appendix 7A** in **Volume 3: Figures and appendices**.
- 7.10.18 The location-based method reflects the average emissions intensity of the UK grid network, while the market-based method reflects emissions associated with the procurement of entirely renewable sources that has been purposefully chosen at LLA.

Figure 7.4 Total airport building and ground operation GHG emissions forecasts for the 'without development' case (dashed line) and 'with development' case (solid line) in all future improvement emission scenarios: (a) location-based method and (b) market-based method for reporting





- 7.10.19 Relative to the 2019 baseline, airport building and ground operation GHG emissions in the 'with development' case decrease in all scenarios when either the location-based method or the market-based method is considered. This is driven by LLA's commitment to reduce operational electricity demand (excluding vehicles) to less than 2.0 kWh/pax by the end of 2023 and to generate at least 25% of electricity demand from on-site renewables by 2026.
- 7.10.20 The difference in airport building and ground operation GHG emissions between the two calculation methods is driven by LLA's commitment to purchase renewable electricity by the end of 2021.
- 7.10.21 Using the location-based method, in 2050, airport building and ground operation GHG emissions from the 'with development' case are 3.8 – 8.2 ktCO_{2e}/yr. Using the market-based method, in 2050, airport building and ground operation GHG emissions from the 'with development' case are 4.1 – 4.3 ktCO_{2e}/yr.

7.11 Assessment of effects: the global climate

- 7.11.1 As described in **Section 7.7** the only receptor for the climate assessment is the global climate, which is a highly sensitivity receptor. All increases in GHG emissions to the atmosphere are considered negative, direct, and permanent effects.
- 7.11.2 The magnitude of the GHG emissions from the Proposed Scheme is assessed based on the tests described in **Section 7.9**, sub-section **Methodology for assessing overall effect of GHG emissions associated with the Proposed Scheme**.

Aviation Emissions

- 7.11.3 This sub-section considers the following magnitude test:

The extent to which the scheme materially affects the ability of the UK to meet the aviation 'planning assumption'.

The scale of international aviation GHG emissions in the 'with development' case is contextualised within the current UK 'planning assumption' for international aviation of 37.5 MtCO₂⁶⁶. The CCC '

Pathway' value for GHG emissions from the aviation sector of 23 MtCO_{2e}⁶⁹, which is not current Government policy, is also considered as a sensitivity assessment.

International aviation GHG emissions from the Proposed Scheme

- 7.11.4 The difference in GHG emissions between the 'with development' case and the 'without development' case in each assessment year describes the impact of the activities associated with the Proposed Scheme only. The international aviation GHG emissions associated with the Proposed Scheme (i.e. expanding from 18 to 19 mppa) as a percentage of 37.5 MtCO₂/yr planning assumption are shown in **Figure 7.5**.

Figure 7.5 International aviation GHG emissions from the expansion of LLA (i.e. the Proposed Scheme only) as a proportion of the 37.5 MtCO₂/yr planning assumption.



- 7.11.5 The aviation forecasts for the 'with development' case include a more rapid fleet transition to the latest generation of aircraft than the 'without development' case. For this reason, emissions associated with the Proposed Development in 2028 are negative as the 'without development' case is forecast to have higher international aviation emissions.
- 7.11.6 At their peak in 2032 under all scenarios, the international aviation GHG emissions associated with the Proposed Scheme itself (i.e. the increase from 18 to 19 mppa) are projected to equate to 0.06% of the 37.5 MtCO₂/yr planning assumption.

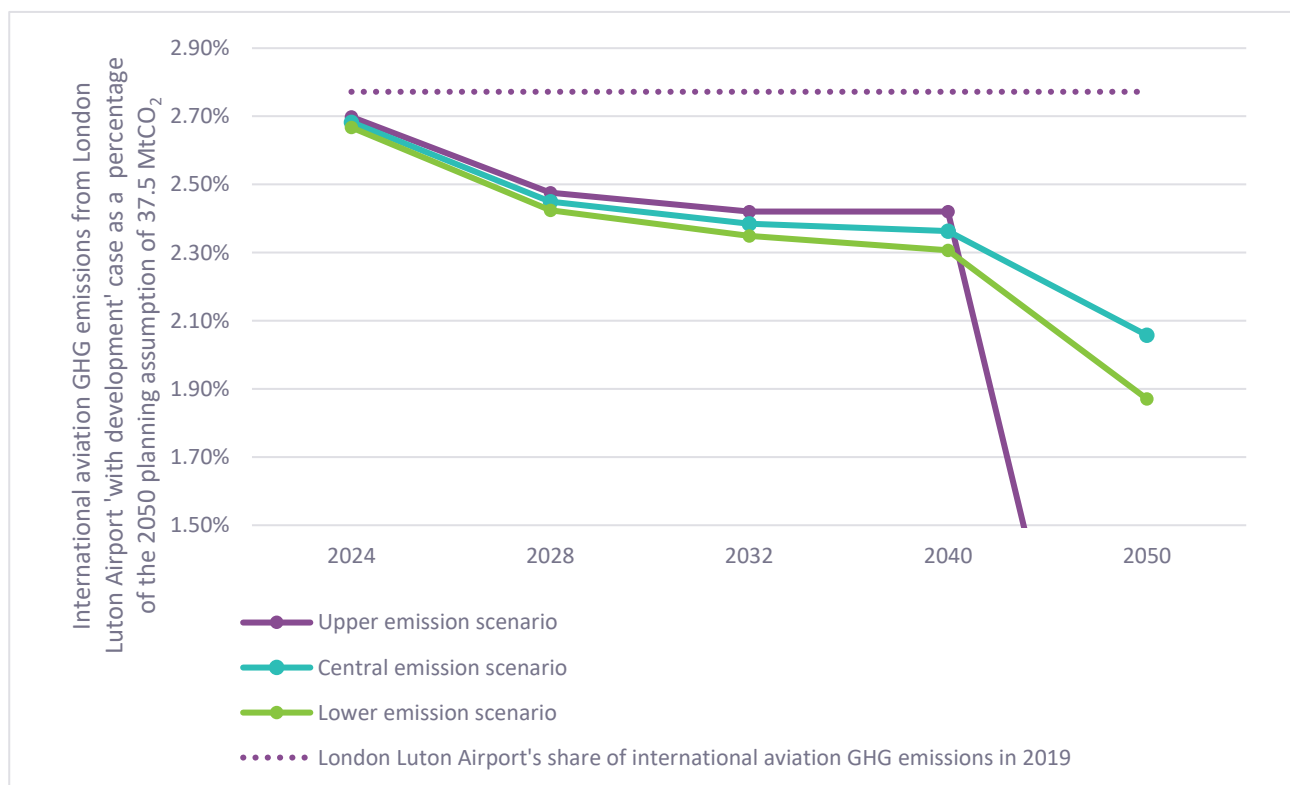
International aviation GHG emissions from the whole airport

- 7.11.7 Baseline international aviation GHG emission from flights departing the UK in 2018 were 36.7 MtCO₂¹⁰⁴. 2019 data is not yet available for the UK, but estimates suggest international aviation increased by 1.7%, such that the 2019 baseline is estimated to be 37.3 MtCO₂. Based on the estimated 2019 UK total for international aviation, international aviation emission from LLA as a whole in 2019 (i.e. 18 mppa) represented 2.77% of the UK total.¹²⁴

¹²⁴ Data showing international aviation UK totals only for 2019 is anticipated to be released in early 2021.

- 7.11.8 Dependent on the scenario used, total international aviation emissions from LLA in the 'with development' case in 2050 (i.e. 19 mppa) represent 1.85 – 2.18% of the planning assumption (**Figure 7.6**). Therefore, it can be determined that the share of UK emissions from LLA is unlikely to increase compared to its share in the baseline and is therefore unlikely to materially affect the ability of the UK to meet the planning assumption¹²⁵.

Figure 7.6 International aviation GHG emissions from the 'with development' case, representing all international aviation emissions from an expanded LLA (including the Proposed Scheme) as a 'share' of the 37.5 MtCO₂/yr planning assumption. LLA's 2019 (i.e. 18 mppa) 'share' of estimated baseline international aviation GHG emissions from flights departing the UK in 2019 is shown for reference.



Sensitivity analysis for all aviation emissions at London Luton Airport

- 7.11.9 Achieving the aviation sector target of 23 MtCO₂e/yr in 2050 in the CCC's 'Balanced Pathway' scenario requires additional aviation policy implementation. Policy recommendations have been made by the CCC in the Sixth Carbon Budget report and have been used to create a fourth future scenario for the sensitivity assessment. This is shown alongside the upper, central, and lower emission scenarios in this sensitivity assessment.
- 7.11.10 The aviation GHG emissions associated with the Proposed Scheme (i.e. the increase from 18 to 19 mppa) as a percentage of the 23 MtCO₂/yr suggestion are shown in **Figure 7.7**.

¹²⁵ There is no specific requirement for a particular airport to maintain a 'share' of the UK total. This metric is used to inform the assessment of GHGs of this Proposed Development against the 'planning assumption' but does not predicate that maintaining any particular airport's existing share in the future is a requirement for expansion.

Figure 7.7 Aviation GHG emissions from the expansion of LLA (i.e. the Proposed Scheme only) as a proportion of the 23 MtCO_{2e}/yr planning suggestion.



- 7.11.11 Aviation GHG emissions associated with the Proposed Scheme itself peak in 2032, at which point they are projected to equate to a maximum of 0.10% of the 23 MtCO_{2e}/yr suggestion. This reduces to 0.07% in 2050, in the CCC's 'Balanced Pathway' scenario.
- 7.11.12 Dependent on the scenario used, total aviation emissions from LLA in the 'with development' case in 2050 represent 3.13 to 3.69% of the 23 MtCO₂ suggestion in the upper, central, and lower emission scenario. In the more ambitious scenario, which includes additional policy implementation as suggested by the CCC in the 'Balanced Pathway' scenario, by 2050 LLA's share of the 23 MtCO_{2e}/yr suggestion is 2.71% which is equal to its 2019 share of actual emissions (**Figure 7.8**).
- 7.11.13 Therefore, it can be determined that given national and aviation sector ambition and associated implementation of aviation policy, the share of aviation emissions from LLA is unlikely to increase compared to the baseline even if the CCC suggestion were brought into policy.

Figure 7.8 Aviation GHG emissions from the 'with development' case, representing all aviation emissions from an expanded LLA (including the Proposed Scheme) as a 'share' of the 23 MtCO₂/yr planning suggestion. LLA's 2019 (i.e. 18 mppa) 'share' of actual baseline aviation sector GHG emissions from flights departing the UK in 2019 is shown for reference.



7.11.14 If the UK Government accepts the reduced aviation sector budget when setting the UK's sixth carbon budget in 2021, then further measures such as those suggested by the CCC⁶⁹ will need to be put in place through legal mechanisms and policy drivers to assist with emission reductions across the aviation sector. These measures are beyond LLA's control but would need to be taken into account when considering the extent to which the Proposed Scheme materially affects the Government's ability to achieve any such future policy position.

Summary

7.11.15 Given that there is a projected long-term increase in international aviation GHG emissions in the 'with development' case compared to the 'without development' case, there is a residual adverse impact on the global climate. However, as the Proposed Development represents only 0.05 – 0.06% of the 37.5 MtCO₂/yr 'planning assumption', and LLA's total share of UK international aviation GHG emissions in the 2050s is less than it is in the 2019 baseline, it is very unlikely that the Proposed Development will materially affect the ability of the UK to meet the 37.5 MtCO₂/yr 'planning assumption'.

UK Carbon Target for 2050 and UK Carbon Budgets (non-international aviation)

7.11.16 This sub-section considers the following magnitude test:

The extent to which the scheme affects the ability of the UK to meet its target and budgets.

The scale of the GHG emissions from all sources except international aviation in the 'With Development' case is contextualised within their overall impact on the UK Government's UK carbon

target of 'net zero' in 2050 and UK carbon budgets^{65,66}. The scale of the GHG emissions from all sources except aviation in the 'With Development' case is also considered within the context of local objectives for reducing GHG emissions. Therefore, the extent to which the Proposed Development affects the ability of Luton Borough Council to meet its climate change objectives for a carbon neutral area by 2030⁷⁹ is taken into account. However, as the local objectives are not yet part of local planning policy, they are given less weight than the national Net Zero target⁶⁵ and the associated budgets in this magnitude test⁶⁶.

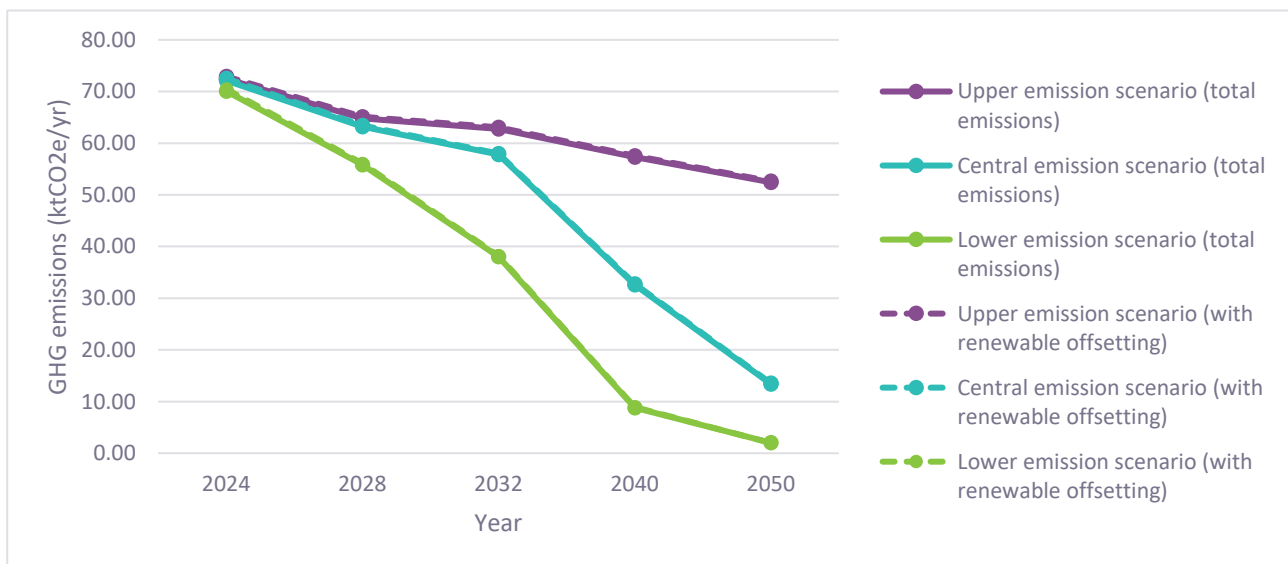
7.11.17 The following GHG emissions sources are considered for this magnitude test:

- Airport buildings and ground operations;
- Surface access; and
- Domestic aviation (Landing and Take-Off (LTO) and climb, cruise and descent (CCD) phases).

7.11.18 The difference in GHG emissions between the 'with development' case and the 'without development' case in each assessment year describes the impact of the activities associated with the Proposed Scheme only. **Figure 7.9** shows the projected GHG emissions that are considered in the UK Carbon Target⁶⁵ and UK Carbon Budgets⁶⁶. Both the total emissions and residual emissions following offsetting commitments are shown.

7.11.19 At the peak in 2024, GHG emissions for this magnitude test from the Proposed Scheme are 70.1 – 72.5 ktCO_{2e}/yr depending on the future scenario considered.

Figure 7.9 Total GHG emissions (solid line) and residual GHG emissions once offsetting commitments for renewable electricity supply are considered (dashed line) which contribute to the UK Carbon Target and UK Carbon Budgets from the Proposed Scheme only.



7.11.20 In 2050 GHG emissions from the Proposed Scheme that are considered in the UK Net Zero 2050 Target are between 2 – 52.6 ktCO_{2e}/yr, dependent on the scenario used. Offsetting commitments have a negligible impact.

7.11.21 The residual GHG emissions in 2050 relate to the following sources:

- Surface access GHG emissions to and from the airport by passengers and staff. This accounts for the large range between scenarios, with the higher emissions scenario representing a slower

transition to low emissions vehicles compared to the other scenarios. These emissions require a coordinated approach with local authorities to reduce.

- Emissions from airport building and ground operations. Some of these emissions relate to Scope 3 activities that require a coordinated approach with partners on-site to reduce.
- A small amount of energy related to electricity transmission that remains in the bought renewable electricity factor.
- 2024 GHG emissions are assumed to be representative of the fourth carbon budget period (2023-2027)⁶⁶. The total carbon budget for the UK in this period is 1,950,000 ktCO_{2e}/yr. The percentage of this budget associated with the Proposed Scheme is 0.018 - 0.019%.

- 7.11.22 2028 and 2032 GHG emissions are assumed to be representative of the fifth carbon budget period (2028-2032)⁶⁶. The total carbon budget for the UK in this period is 1,725,000 ktCO_{2e}/yr. The percentage of this budget associated with the Proposed Scheme is 0.014 - 0.019%.
- 7.11.23 The Luton Borough Council Climate Change Action Plan⁷⁹ aims for a carbon neutral borough by 2040. To date, this is an aim rather than a policy and the scope of this aim has not yet been defined. In 2040, relevant GHG emissions associated with the Proposed Scheme are 8.9 – 57.6 ktCO_{2e}/yr.
- 7.11.24 The residual GHG emissions from airport buildings and operations assessment and journeys to and from the Airport will require further mitigations or offsetting in order to not affect the ability of the UK Government to meet its 2050 net zero target. LLAOL has committed to work with Government, LBC and other stakeholders to develop their approach to becoming a net zero airport and will continue to monitor, report and review targets beyond 2024 through annual corporate reporting. A majority of the residual GHG emissions are Scope 3 emissions and are therefore not controlled by LLAOL.
- 7.11.25 The mitigations required to achieve LLAOL's net zero aim will be detailed in a Carbon Reduction Plan, which will include emissions reduction targets. The Carbon Reduction Plan will set out the roadmap for achieving a net zero airport for Scope 1 and 2 emissions, as well as indicating the approaches by which LLAOL can influence Scope 3 emissions. An outline version of the Carbon Reduction Plan will be produced during the consideration of this ES, and ahead of the determination of the planning application. Further details are described in **Section 7.13**.

Summary

- 7.11.26 On the basis of the commitment to produce a Carbon Reduction Plan, the scale of GHG emissions from the Proposed Scheme are such that they will have a negligible effect on the ability of the UK to meet its carbon targets. Additionally, the scale of GHG emissions from the Proposed Scheme are such that they are unlikely to affect the ability of Luton Borough Council to meet its carbon neutral borough aim.

Summary of predicted effects

- 7.11.27 The overall assessment of effects is based on the sensitivity of the receptor and magnitude of the GHG emissions as described in **Section 7.9**, sub-section **Methodology for assessing overall effect of GHG emissions associated with the Proposed Scheme**.
- 7.11.28 The global climate is the largest inter-related cumulative environmental effect⁸³, so the receptor can be considered highly sensitive.
- 7.11.29 The overall effect of GHGs associated with the Proposed Scheme is based on the magnitude tests set out in **Section 7.9**, sub-section **Methodology for assessing overall effect of GHG emissions associated with the Proposed Scheme**. An assessment of projected GHG emissions associated

with the Proposed Scheme against these tests is set out in each of the sub-sections in **Section 7.11**. To summarise:

- For international aviation emissions, the 'with development' case represents 1.85 – 2.18% of the planning assumption of 37.5 MtCO₂/yr in 2050. This is less than LLA's share of actual baseline international aviation GHG emissions from flights departing the UK in 2019 (2.82%). The GHG emissions associated with the Proposed Scheme itself are 0.05 – 0.06% of the 37.5 MtCO₂/yr planning assumption in 2050.
- For all other GHG emissions, residual emissions associated with the Proposed Scheme (i.e. the increase in emissions between the 'with development' and 'without development' case), once offsetting commitments have been considered, are 1.99-52.64 ktCO_{2e}/yr.
- Most of the residual emissions are Scope 3 and are thus not under the control of LLA.

7.11.30 The mitigations set out in **Section 7.8**, show that the GHG emissions associated with the Proposed Scheme have been mitigated wherever practicable, with a further commitment to producing a Carbon Reduction Plan as described in further detailed in **Section 7.13**. The Carbon Reduction Plan will be required to set out the ambition and actions required for ensuring LLA's Scope 1 and 2 emissions are in-line with the UK net zero 2050 target, and how LLA will use its influence to reduce Scope 3 emissions where possible.

7.11.31 LLAOL is committed to annually reporting its GHG emissions through annual carbon footprinting, which is publicly available.

7.11.32 Therefore, the Proposed Scheme:

- Is very unlikely to materially affect the ability of the UK Government to meet the 37.5 MtCO₂/yr 'planning assumption' for UK international aviation GHG emissions in 2050.
- Is unlikely to materially affect the ability of the UK Government to meet its carbon targets for net zero in 2050, on the basis that a Carbon Reduction Plan is produced.
- Is unlikely to materially affect the ability of Luton Borough Council to meet its carbon neutral borough by 2040 aim, on the basis that a Carbon Reduction Plan is produced.
- Is consistent with the National Planning Policy Framework (NPPF)⁷⁶ requirement for developments to 'support the transition to a low carbon future in a changing climate', on the basis that a Carbon Reduction Plan is produced.

7.11.33 Given the magnitude criteria shown in **Table 7.7**, the Proposed Scheme is considered to have a **low GHG emissions magnitude**.

7.11.34 Following the approach set out in **Table 7.8**, the overall effect of projected GHGs associated with the Proposed Scheme on the global climate is considered **minor adverse**, and therefore **not significant** based on the commitment for further mitigations.

7.11.35 A sensitivity assessment for a lower international aviation GHG emissions 'headroom' has been carried out, in which the 2050 GHG emissions from LLA would still represent a reduced share of total UK emissions than in the 2019 baseline.

7.12 Assessment of cumulative effects

7.12.1 The assessment described in this ES chapter is effectively cumulative in nature, and thus a separate cumulative effects assessment is not required.

- 7.12.2 The assessment in this chapter can be regarded as a cumulative assessment as the national and local GHG emissions budgets and targets used for contextualisation are in place regardless of future trends such as airport development and demand change, technology development and population change. Therefore, it has not been necessary to carry out a separate cumulative effects assessment of GHG emissions as part of this ES.

7.13 Consideration of additional mitigation

- 7.13.1 The assessment set out above has concluded that it will be necessary to implement further mitigation measures to reduce residual GHG emissions. These additional measures have not been assessed as part of the Proposed Scheme.
- 7.13.1 This section sets out the measures to mitigate emissions that are not quantifiable within the calculation detailed in **Section 7.10**. They represent strategic commitments made by LLAOL with regards to emissions reduction.
- 7.13.2 A Carbon Reduction Plan will be produced which will set out the roadmap for achieving a net zero airport for Scope 1 and 2 emissions, as well as indicating the approaches by which LLAOL can influence Scope 3 emissions. An outline version of the Carbon Reduction Plan will be set out ahead of the determination of the planning application by LBC.
- 7.13.3 LLAOL's continued engagement with Sustainable Aviation and commitment to reach the advanced levels of certification within the Airport Carbon Accreditation Scheme shows leadership in airport sustainability that will feed into future carbon management activities.

Airport building and ground operations

- 7.13.4 Through the Responsible Business Strategy¹¹⁸, LLAOL has committed to being aligned with the UK net zero target for 2050. LLAOL has therefore committed to develop a Carbon Reduction Plan, which will set out the ambition and actions required for ensuring LLA's Scope 1 and 2 emissions are in-line with the UK net zero 2050 target. An outline version of the Carbon Reduction Plan will be produced during consideration of the ES, and ahead of determination of the planning application. The full version would be provided following planning approval, as a time-bound condition of the planning permission. This forms part of the wider commitment to reaching more ambitious levels of certification within the Airport Carbon Accreditation Scheme, which would ultimately result in carbon neutral operations.
- 7.13.5 The Carbon Reduction Plan will also set out the approaches by which LLAOL can influence the reduction of Scope 3 emissions, including on-site stakeholders such as airside partners, hotels, retail etc.

Surface access

- 7.13.6 Most of the residual emissions in 2050 relate to surface access associated with the Proposed Scheme. LLAOL has committed to surface access targets for reducing non-electric private car journeys from passengers and non-electric single occupancy trips by staff by 2024 in the Travel Plan. These have not been incorporated in the surface access assessment due to uncertainties in future projections. It is therefore anticipated that surface access emissions in the 'with development' case will be lower than those presented in **Section 7.10** of this report due to improvements in sustainable surface access driven by further targets set by LLAOL.
- 7.13.7 LLAOL have committed to develop their approach to becoming a net zero airport through the production of a Carbon Reduction Plan. This will include identifying the approaches by which LLAOL can influence the reduction of Scope 3 emissions, including surface access. Key stakeholders,

including local authorities and transport providers, will be engaged in the development of the Carbon Reduction Plan.

- 7.13.8 LLAOL will continue to monitor, report and review targets beyond 2024 through the Surface Access Strategy monitoring process.

Aviation emissions

- 7.13.9 LLAOL have committed to develop their approach to becoming a net zero airport through the production of a Carbon Reduction Plan. This will include identifying the approaches by which LLAOL can influence the reduction of Scope 3 emissions, including surface aviation. Key stakeholders, including local authorities, aviation sector organisations and airlines, will be engaged in the development of the Carbon Reduction Plan.

7.14 Conclusions of significance evaluation

- 7.14.1 The only receptor for the GHG assessment is the global climate, which is a highly sensitive receptor due to the global impacts of climate change. All increases in GHG emissions to the atmosphere are considered negative, direct, and permanent effects.
- 7.14.2 The magnitude of the GHG emissions from the Proposed Scheme is assessed based on the tests described in **Section 7.9**, sub-section **Methodology for assessing overall effect of GHG emissions associated with the Proposed Scheme**.
- 7.14.3 For international aviation GHG emissions, LLA's 'share' of the UK planning assumption of 37.5 MtCO₂/yr in 2050 is less than the 'share' of emissions it had in the 2019 baseline. Furthermore, the emissions from the Proposed Scheme itself are only 0.05 – 0.06% of the planning assumption. Therefore, it is considered highly unlikely that the Proposed Scheme will materially affect the ability of the UK to meet the 37.5 MtCO₂/yr planning assumption.
- 7.14.4 For all other GHG emissions, there is an increase in projected GHG emissions associated with the Proposed Scheme case (i.e. the 'with development' case relative to the 'without development' case) in 2050. Residual Scope 1 and 2 emissions require to be further reduced to net zero by 2050 through the additional mitigations described in **Section 7.13**, including the Carbon Reduction Plan. The Carbon Reduction Plan will also set out how LLAOL will influence the reduction of Scope 3 emissions, for example by working with on-site partners, transport providers, local authorities, and airlines. Given the commitment to produce a Carbon Reduction Plan, it is considered unlikely that the Proposed Scheme will materially affect the ability of the UK to meet its carbon target for net zero by 2050, as legislated in the Climate Change Act⁶⁵.
- 7.14.5 Given the magnitude criteria shown in **Table 7.7**, and assessed in **Section 7.11** and the enactment of the further mitigations in **Section 7.13**, the Proposed Scheme is considered to have **a low GHG emissions magnitude**.
- 7.14.6 Following the approach set out in **Table 7.8**, the overall effect of GHGs associated with the Proposed Scheme on the global climate is considered **minor adverse** and therefore **not significant**.

7.15 Implementation of environmental measures

- 7.15.1 **Table 7.10** describes the environmental measures embedded within the Proposed Scheme and the means by which they will be implemented, i.e. they will have been secured through the planning conditions.

Table 7.10 Summary of environmental measures to be implemented – relating to climate

Environmental measure	Responsibility for implementation	Compliance mechanism	ES section reference
Carbon Reduction Plan	LLAOL	Subject to a time-bound planning condition	7.11, 7.13
Achieving objectives and targets relating to surface access as set out in the Travel Plan	LLAOL	ASAS monitoring	7.8
Monitoring, reporting, and reviewing targets relating to surface access through the Surface Access Strategy monitoring process.	LLAOL	ASAS monitoring	7.8
Scope 1 and 2 improvements as set out in the Responsible Business Strategy 2020-2025	LLAOL	Annual monitoring report	7.8
Achieving further levels in Airport Carbon Accreditation Scheme	LLAOL	Annual monitoring report	7.8

8. Noise

8.1 Introduction

- 8.1.1 This chapter of the ES assesses the likely significant effects of the Proposed Scheme with respect to noise. The chapter should be read in conjunction with the **Chapter 3: Description of the Proposed Scheme** and with respect to relevant parts of **Chapter 9: Human health** and **Chapter 10: Transport**, where common receptors have been considered and where there is an overlap or relationship. This chapter supplements the noise chapter in the 2014 Planning Permission 2012 ES.
- 8.1.2 This noise assessment has assessed the likely significant effects arising from the proposed change to Condition 8 to raise the passenger throughput cap to 19 mppa, and those arising from the proposed increases to the daytime and night-time noise contours, through the variation of Condition 10, for the period to the end of 2027, and from 2028 onwards (see **Section 3.2**).

8.2 Limitations of this assessment

- 8.2.1 The proposed condition variations have been based upon forecasts for future aircraft operations and the resultant noise levels. There is an inherent uncertainty in forecasting aircraft movements which is based on multiple factors including fleet mix assumptions.
- 8.2.2 Aircraft operation forecasts for the Proposed Scheme's scenarios have been supplied by LLAOL¹²⁶ and are therefore assumed to be correct at the time of writing. It is understood that the assumed numbers of new generation aircraft are based on airline orders for the relevant aircraft between now and 2026, and this has been represented in LLAOL's fleet mix assumptions.

8.3 Relevant legislation, planning policy, and technical guidance

- 8.3.1 A full explanation of the relevant legislation, policy and guidance is presented in **Appendix 8A** in **Volume 3: Figures and Appendices**. The following provides a summary of key documents used within this assessment.

Legislative context

- 8.3.2 The following legislation is relevant to the assessment of the effects on noise receptors:
- The *Civil Aviation Act*¹²⁷;
 - The *Aerodromes (Noise Restrictions) (Rules and Procedures) Regulations 2003*¹²⁸
 - *Directive 2002/30/EC*¹²⁹;
 - *European Union (EU) Regulation 598*¹³⁰;

¹²⁶ A discussion on how the forecasts are used within the noise modelling software is provided within Appendix 10B.

¹²⁷ Civil Aviation Act, 2006 [online]. Available at: <https://www.legislation.gov.uk/ukpga/2006/34/contents> [Accessed 10 November 2020].

¹²⁸ The Aerodromes (Noise Restrictions) (Rules and procedures) Regulations, 2003 [online]. Available at: <https://www.legislation.gov.uk/uksi/2003/1742/contents/made> [Accessed 10 November 2020].

¹²⁹ Directive 2002/30/EC. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32002L0030&from=EN> [Accessed 10 November 2020].

¹³⁰ Regulation (EU) 598/2014, [online]. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014R0598&from=EN> [Accessed 10 November 2020].

- *Environmental Noise Directive (2002/49/EC)*¹³¹ (END); and
- *Environmental Noise (England) Regulations 2006* (as amended)¹³².

Planning policy context

8.3.3 The main policy documents which are referred to within this assessment are further summarised in **Table 8.1**.

Table 8.1 Policy relevant to the noise assessment

Policy reference	Policy issue
National planning policies	
Noise Policy Statement for England (NPSE) (Defra, 2010) ¹³³	<p>The NPSE sets out the long-term vision of the Government and within the context of policy on sustainable development aims to:</p> <ul style="list-style-type: none"> • avoid significant adverse impacts on health and quality of life; • mitigate and minimise adverse impacts on health and quality of life; and • where possible, contribute to the improvement of health and quality of life. <p>It introduces three 'Effect Levels' relevant to the assessment of noise; the two of concern within this assessment are:</p> <ul style="list-style-type: none"> • LOAEL: Lowest Observed Adverse Effect Level – this is the level above which adverse effects on health and quality of life can be detected; and • SOAEL: Significant Observed Adverse Effect Level – this is the level above which significant adverse effects on health and quality of life occur. <p>The aim of the NPSE is to avoid all noise occurring at the SOAEL level and to minimise, as far as possible, all noise occurring between the LOAEL and SOAEL brackets.</p>
The Planning Practice Guidance for Noise (PPG-N) (MCHLG, 2019) ¹³⁴	<p>Published by the Ministry of Housing, Communities and Local Government introduces a fourth effect level not included in the NPSE:</p> <p>UAE – Unacceptable Adverse Effect Level – this is the level above which extensive and regular changes in behaviour and/or an inability to mitigate the effect of noise leading to psychological stress or physical effects occurs.</p>
Aviation Policy Framework (APF) (2013) ¹³⁵	<p>By defining the Government's objectives and policies on the impacts of aviation, the APF sets out the framework within which decisions on aviation ought to be made to deliver a balanced approach to securing the benefits of aviation and to support economic growth.</p> <p>The APF states that the "Government wants to see the best use of existing airport capacity" and that in the short-term, a key priority for Government is to continue to work with the aviation industry and other stakeholders to make better use of existing runways at all UK airports to improve performance, resilience and the passenger experience.</p>

¹³¹ Directive 2002/49/EC, [online]. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32002L0049&from=EN> [Accessed 10 November 2020].

¹³² The Environmental Noise (England) Regulations, 2006 [online]. Available at: <http://www.legislation.gov.uk/ukxi/2006/2238/contents/made> [Accessed 10 November 2020].

¹³³ Department for Environment, Food and Rural Affairs (2010), Noise Policy Statement for England [online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69533/pb13750-noise-policy.pdf [Accessed 12 November 2020].

¹³⁴ Ministry of Housing, Communities and Local Government (2019), The Planning Practice Guidance for Noise [online]. Available at: <https://www.gov.uk/guidance/noise--2> [Accessed 12 November 2020].

¹³⁵ Secretary of State for Transport (2013) Aviation Policy Framework [online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/153776/aviation-policy-framework.pdf [Accessed 12 November 2020].

Policy reference	Policy issue
Consultation Response on UK Airspace Policy: A Framework for Balanced Decisions on the Design and use of Airspace¹³⁶	<p>The Consultation Response confirms: "The government has issued revised Air Navigation Directions and Air Navigation Guidance to the CAA which will take effect from 1 January 2018". With regard to aircraft noise the Consultation Response sets out that:</p> <ul style="list-style-type: none"> "The Government's current aviation policy is set out in the Aviation Policy Framework (APF). The policies set out within this document provide an update to some of the policies on aviation noise contained within the APF and should be viewed as the current government policy." "Consistent with the Noise Policy Statement for England, our objectives in implementing this [UK airspace] policy are to: ... limit and, where possible, reduce the number of people in the UK significantly affected by the adverse impacts from aircraft noise." "The specific daytime and night-time values proposed for the LOAEL: 51 dB $L_{Aeq, 16hr}$ and 45 dB L_{night} also received broad support" and therefore "We [the Government] will set a LOAEL at 51 dB $L_{Aeq, 16hr}$ for daytime noise and based on feedback and further discussion with CAA we are making one minor change to the LOAEL night metric to be 45 dB $L_{Aeq, 8hr}$ rather than L_{night} to be consistent with the daytime metric." "The Government acknowledges the evidence from recent research which shows that sensitivity to aircraft noise has increased, with the same percentage of people reporting to be highly annoyed at a level of 54 dB $L_{Aeq, 16hr}$ as occurred at 57 dB $L_{Aeq, 16hr}$ in the past." the Government continues to expect airport operators to offer households exposed to levels of noise of 69 dB $L_{Aeq, 16h}$ or more, assistance with the costs of moving; the Government also expects airport operators to offer acoustic insulation to noise-sensitive buildings, such as schools and hospitals, exposed to levels of noise of 63 dB $L_{Aeq, 16h}$ or more; and "As a minimum, the Government would expect airport operators to offer financial assistance towards acoustic insulation to residential dwellings which experience an increase in noise of 3 dB or more which leaves them exposed to levels of noise of 63 dB $L_{Aeq, 16h}$ or more."
Development plan policies	
Luton local plan (2011-31), adopted 2017	<p>Policy LLP6: London Luton Airport Strategic Allocation, states in relation to airport expansion that proposals for development will only be supported where:</p> <ul style="list-style-type: none"> "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; v. achieve further noise reduction or no material increase in day or night time noise or otherwise cause excessive noise including ground noise at any time of the day or night and in accordance with the airport's most recent Airport Noise Action Plan; vi. include an effective noise control, monitoring and management scheme that ensures that current and future operations at the airport are fully in accordance with the policies of this Plan and any planning permission which has been granted; vii. include proposals that will, over time, result in a significant diminution and betterment of the effects of aircraft operations on the amenity of local residents, occupiers and users of sensitive premises in the area, through measures to be taken to secure fleet modernisation or otherwise"

¹³⁶ Department for Transport (2017) Consultation Response on UK Airspace Policy: a framework for balanced decisions on the design and use of airspace, [online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/653801/consultation-response-on-uk-airspace-policy-web-version.pdf [Checked July 2020].

Policy reference	Policy issue
	<i>Policy LLP38: 'Pollution and Contamination' considers the effects of noise associated with new development and states that where adverse impacts are identified, appropriate mitigation will be required.</i>

Technical guidance

- 8.3.4 The main guidance documents and standards which are referred to within this assessment are further summarised in **Table 8.2**.

Table 8.2 Guidelines relevant to the noise assessment

Guidance	Relevance
World Health Organization (WHO) Environmental Noise Guidelines for the European Region (2018)¹³⁷	The 2018 guidelines present health-based recommendations for environmental noise exposure, including for aircraft noise. The guidelines recommend reducing noise levels produced by aircraft below 45 dB L_{den} to mitigate adverse health effects. For night-time, the guidelines recommend reduction in noise levels produced by aircraft to below 40 dB L_{night} to help mitigate adverse effects on sleep.
IEMA Guidelines for Environmental Noise Impact Assessment (2014)¹³⁸	The guidelines describe how the assessment of noise effects should be presented within the EIA process. The IEMA guidelines cover aspects such as scoping assessments, baseline prediction and definitions for significance criteria.

8.4 Data gathering methodology

- 8.4.1 Historically airports in the UK use one of two noise models to calculate aircraft noise; the UK civil aircraft noise contour model (ANCON), developed and maintained by the CAA, or the Integrated Noise Model (INM), produced by the US Federal Aviation Administration (FAA).
- 8.4.2 In 2015 INM was replaced by the Aviation Environmental Design Tool (AEDT), which is also produced by FAA. INM is now considered by the FAA as legacy software. Due to the release of AEDT, the FAA stopped supporting INM and will therefore not update the model or its associated database with new aircraft technology.
- 8.4.3 For the 2014 Planning Permission 2012 ES, all modelling was undertaken using INM. For consistency with the modelling underpinning the 2014 Planning Permission 2012 ES, the INM model has been retained for use for the purposes of this assessment.
- 8.4.4 Air traffic movements presented in **Appendix 8C in Volume 3: Figures and Appendices**, have been provided by LLAOL and consist of forecasts based on predicted passenger numbers and fleet mixes. The runway and departure route split for all scenarios (including an update of the original 12.5 mppa 2028 future baseline) is based on a five-year average over the years 2015 to 2019. Noise levels, for individual aircraft, have been validated against actual operation for the most frequently operating types.
- 8.4.5 Details of the modelling methodology are contained in **Appendix 8B in Volume 3: Figures and Appendices**.

¹³⁷ World Health Organization (2018) Environmental Noise Guidelines for the European Region [online]. Available at: https://www.euro.who.int/_data/assets/pdf_file/0008/383921/noise-guidelines-eng.pdf [Accessed 12 November 2020].

¹³⁸ Institute of Environmental Management and Assessment (2014) Guidelines for Environmental Noise Impact Assessment, London.

- 8.4.6 The assessment of aircraft noise is based on an 'average summer's day' period from 16th June to 15th September. This 92-day period is used to account for the increased aircraft traffic during the summer season seen at many UK airports and consistent with the $L_{Aeq,16hr}$ and $L_{Aeq,8hr}$ index.
- 8.4.7 For the purpose of the noise assessment, population growth calculations used to inform the assessment present a larger increase in population than those schemes granted planning permission since 2011 (i.e. the 2014 Planning Permission 2012 ES baseline assessment). The population growth calculations have been used in the assessment of cumulative effects. It should be noted that the population data utilised for the 2014 Planning Permission 2012 ES is now considered out of date and as such, the population and dwellings counts have been updated with more recent population data for 2018. The 2018 population data is supplied under licence for this Proposed Scheme by CACI and applies population forecasts to the latest UK population census of 2011.

8.5 Consultation

- 8.5.1 For the assessment of the 19 mppa scenario, an initial approach to the noise assessment methodology was sent to Luton Borough Council (LBC) on 28 January 2020, with comments received back from the Council and LBC's acoustic consultant. The responses are presented in **Table 8.3**, with notes on and how these have been considered within the assessment. **Table 8.3** also provides an overview of noise issues that were raised during the non-statutory consultation, identifies how the EIA has had regard to those issues, and where further information can be found in this chapter.

Table 8.3 LBC comments and considerations from pre-submission consultation

Comment	Consultee	Consideration within this assessment	Considered in section
If it [the application] is a s73 then it is varying conditions (8 and 10 possibly) on the application that was submitted in 2012 (12/01400/FUL) and varied in 2017 (15/00950/VARCON) and so you would need to be looking at the difference from then to now – there is a lot of data available as LLAOL provide their quarterly reports (and annual monitoring report). You would also need to consider the difference between the permission for 18 mppa (what is happening on the ground currently) and the additional 1 mppa.	LBC	There is limited data to undertake comparative assessments with the 2014 Planning Permission 2012 ES, which was based on a short-term assessment against the 2011 baseline and a future baseline in 2028. It is considered that 2028 is the key year of assessment and that the increased mppa should be assessed against both the change in Condition 10 as a result of the proposal and also the difference with the original future year assessment of the 2014 Planning Permission 2012 ES. As it is expected that the effect of the proposals will diminish over time, the worst-case year of airport noise above that allowed for in the existing Condition 10 has also been assessed.	Section 9.8
For the avoidance of doubt, we do expect to see plotted noise contours. We also assume that the same schedule of non-residential receptors will be used.	LBC	Noise contours have been plotted and the same non-residential receptors have been used as in the previous S73 application in 2019 (19/00428/EIA or 19/01253/EIASCRC).	Appendix 9E in Volume 3: Figures and Appendices
You refer to changes to the level and frequency of L_{Amax} and then say a significant effect will be identified if the frequency or level	LBC	An L_{Amax} 80 dB noise contour is considered to be the threshold of potential significant effects. We have undertaken an assessment of the changes in fleet mix and ATMs to identify if there would likely be an increase in L_{Amax} events above 80 dB.	Section 9.8

Comment	Consultee	Consideration within this assessment	Considered in section
increases substantially - have you a view as to what level is considered to be substantial and the level at which you will define a significant effect?			
In terms of N contours; whilst it may not be an 'official assessment process' it is another metric to consider in line with Govt advice (so not just L_{Aeq} 16hr or L_{Aeq} 8hr).	LBC	N-Contours have been considered.	Appendix 9F in Volume 3: Figures and Appendices
Traffic noise needs to consider this in relation to sensitive receptors.	LBC	Consideration for traffic noise was added to the Screening assessment to scope that source of noise out from further assessment; it was deemed to result in negligible effects. No comment was received from LBC as to significant effects from traffic noise.	Section 9.6
You make no mention of ground noise and would need to consider that and determine whether it can be scoped out (or not). If there is an overall increase in the number of ATMs (which may be the case with 19 mppa compared to 18 mppa), then there could be an increase in ground noise (and there are some residents in the area who complain about ground noise from the airport, though to date I am not sure that LLAOL have been able to pick it up in dealing with the residents).	LBC	Ground noise has been considered within the Screening document to determine whether an EIA is required. Additional ATMs were assessed without taking into account any potential benefit of reduced noise from modernisation. Short-term and long-term effects of the 19 mppa scenario were considered negligible.	Section 9.6
Your final point about no construction noise, etc, is accepted assuming that the application is purely for 19 mppa and has no operational development associated with it.	LBC	The growth to 19 mppa will be accommodated without any new on-airport infrastructure as described in Chapter 3: Description of the Proposed Scheme . There have been no changes to agreed approach.	Section 9.6
Comments were received that expressed concerns about the impact of the proposals on local noise level.	Various	The noise assessment has assessed likely significant effects arising from the Proposed Scheme. It explains the likely significant effects arising from the proposed change to Condition 8 to raise the passenger throughput cap to 19 mppa, and those arising from the proposed increases to the daytime and night-time noise contours through the variation of Condition 10 for the period to the end of 2027, and from 2028 onwards.	Section 9.10
Comments were received that requested noise monitoring be carried out, and that noise levels be continually reviewed and reported to local communities on a monthly basis.	Various	Luton Airport has three fixed noise monitoring terminals that constantly monitor the noise from aircraft. They also have four portable noise monitoring terminals, which are used to measure noise levels in local communities. Live updates of the noise monitoring (with a 20 min delay) can be seen from the fixed monitoring stations here: https://travisltn.topsonic.aero/ . The findings from the noise monitoring are reported in regular and publicly available reports, which can be found through the following links:	

Comment	Consultee	Consideration within this assessment	Considered in section
		<ul style="list-style-type: none"> Community noise reports: https://www.london-luton.co.uk/corporate/community/noise/community-noise-reports Quarterly noise reports: https://www.london-luton.co.uk/corporate/community/noise/quarterly-monitoring-report Annual noise reports: https://www.london-luton.co.uk/corporate/community/noise/annual-monitoring-reports 	
Some comments received provided recommendations for noise mitigation or management measures.	Various	Environmental measures embedded into the Proposed Scheme to manage and mitigate noise are presented in Section 8.7 and in Table 8.28 .	Section 8.7, Table 8.28

- 8.5.2 A formal request to LBC for a Screening Opinion under Regulation 5(2) of the *Town and Country Planning (Environmental Impact Assessment) Regulations 2017* was submitted (see **Appendix 1A** and **Appendix 1B** in **Volume 3: Appendices and Figures**). This included an initial assessment of noise from the proposed variation. The screening assessment concluded that the proposed variation would not have a significant effect on noise sensitive receptors. In particular, the screening assessment considered the following:
- increase in road traffic noise effects as a result of increased traffic from the rise in passengers;
 - increase in aviation ground noise from aircraft taxiing; and
 - increase in aviation 'in-air' noise.
- 8.5.3 Based on the increase in the number of dwellings that would be exposed to noise levels above the Significant Observed Adverse Effect Level (SOAEL) as a result of 'in-air' noise, LBC considered that the Proposed Scheme was likely to have a significant environmental effect and therefore required an EIA.
- 8.5.4 In conjunction with the screening request, a standalone Noise Impact Assessment report was submitted to LBC in July 2020 associated with the 19 mppa application. The report received comments from both the Council and the Council's third-party acoustic consultant. The comments were considered within the revision of the assessment as provided within this chapter. The key comments and how they have been addressed are presented in **Table 8.4**.

Table 8.4 LBC comments and considerations from the Noise Impact Assessment

Comment	Consideration within this assessment	Considered in section
The assessment does not justify this extent of relaxation. Seeking a greater relaxation than is technically justified by the noise assessment purely to cover matters of forecasting uncertainty is not an appropriate approach.	The amendment to Condition 10 has been revised with new forecasting and noise predictions. The relaxation submitted is only that required by predicted noise levels based on forecasted flows.	Section 1.2
We do not accept that reference to an entirely separate application (which we understand will be withdrawn once the 19 mppa application is made) can in any way be used to justify the extent of relaxation being sought in this case.	References to the previous S73 (19/00428/EIA or 19/01253/EIASCR) has been removed.	N/A

Comment	Consideration within this assessment	Considered in section
Given current uncertainties within the airline industry associated with Covid-19, how confident is LLOAL that 2021 will indeed be the worst-case operational year? Any further delay in the resurgence of the industry beyond what is currently foreseen might put pressure on 2024 as the year for re-normalisation of Condition 10.	Forecasts have been updated to take into account the latest understanding of how the airlines will operate.	Section 2.2
The assessment and appendices are confusing and appear contradictory, and the explanations provided were not totally understandable. A clear and coherent link between forecast numbers and noise model inputs is required.	A modelling report is presented in the Appendix to provide the necessary explanation in one place. Assessment scenarios and results have been updated.	Appendix 8B in Volume 3: Figures and Appendices
Three separate years as providing baselines against which the 2028 19 mppa noise case is to be compared. There is no text justifying or explaining the merits of these comparisons. They do not include 2019, which by all reasonable standards could be considered the most recent year for which noise contours are available, i.e. the baseline year. BAP Appendix B contains summer's day, day time and night-time movement numbers for 2019 suggesting that this has been the subject of noise modelling.	Assessment scenarios have been updated. The reason for not using 2019 as a baseline was because the noise limits imposed by Condition 10 were already being exceeded during that year and therefore it was not considered an appropriate baseline.	Section 8.8
The acid test of noise effects for any application to vary aircraft operations is the 'with Proposed Scheme' vs. without Proposed Scheme' comparison for the year of full capacity (in this case 2028). By convention, comparison of the 'with Proposed Scheme' case against baseline is also undertaken. We think the basis of this analysis needs to be rationalised and justified	The assessment scenarios are the worst-case year for identification of mitigation, the following years after worst-case year to show reduction in effect, and 2028 both 'with' and 'without' Proposed Scheme mppa increase and baseline.	Section 8.8
No reference is made in the NIA to the plotted contours contained as part of BAP Appendix D. Plots are provided for values of 57 dB daytime and 48 dB night-time in each of years 2021, 2024 and 2028 'with Proposed Scheme' (19 mppa) and 'without Proposed Scheme' (18 mppa). This would not be considered adequate for an ES noise chapter, as contours should as a minimum be plotted at LOAEL, SOAEL, and UAEL as well 54 dB LAeq,16h day as this is now considered to represent the onset for significant community annoyance. Good practice is to plot contours at 3 dB intervals from LOAEL up to UAEL, as was prepared for the S.73 application (19/00428/EIA or 19/01253/EIASCRC). In this way, locations affected by noise at different average levels during the daytime and night-time can be identified.	Figures referenced in the chapter and include contour values.	Section 8.9 and Appendix 8E in Volume 3: Figures and Appendices
We believe the method for assessing the magnitude of change to be an unnecessarily convoluted and not 100% reliable way of assessing the noise level difference between two scenarios given that the noise model is able to identify the actual range of differences across the entire assessment grid.	Method has been amended to use a matrix of noise level change and absolute noise levels at receptor points, so the convoluted calculation method is not required.	Section 8.9
A large amount of data is presented in tabular form in the appendices. It seems to be excessive given the additional information that can be gleaned from L _{Amax} flyover effects.	The assessment within the chapter is considered to be sufficiently concise. The appendices provide all supporting information required for reviewing the application.	Section 8.9 and Appendix 8E in Volume 3: Figures and Appendices

Comment	Consideration within this assessment	Considered in section
The commitment to funding of the SIGS appears to fall short to the tune of £1,300,000. There is no reference to any funding post 2021.	The mitigation has been revised and detailed within the chapter.	Section 8.7

8.6 Scope of the assessment

Spatial scope

- 8.6.1 The spatial scope of the assessment of noise covers the area of the Proposed Scheme, together with an area extending to the worst-case noise attributed to aviation for the 51 dB $L_{Aeq,16hr}$ daytime contour and 45 dB $L_{Aeq,8hr}$ night-time contour¹³⁹. Additional locations have been modelled outside of these noise contour areas to show the predicted noise levels at nearby communities.

Temporal scope

- 8.6.2 The key assessment year is the future year of 2028, which corresponds to the future year identified within the 2014 Planning Permission 2012 ES. However, there are years prior to this that also need assessment for three reasons:
- 1) The variation to Condition 10 presents a new area limit for the daytime 57 dB $L_{Aeq,16hr}$ and night-time 48 dB $L_{Aeq,8hr}$ assessment, which is based on the widest area, predicted to be in 2021 with 18 mppa.
 - 2) As modernization reduces the noise effect from the airport operations, the 2028 year would not be the worst-case scenario. To ensure that environmental measures required to minimise significant noise effects encompass the worst-case effect from the Proposed Development, interim years between 2021 and 2028 also need to be assessed. The worst-case year has been identified as 2022. Additional years of 2023 and 2024 have been included as information to show how noise decreases, supporting the conclusion that 2022 is the worst-case year for significant effect.
 - 3) 2024 has also been assessed because this is the first year where 19 mppa is predicted to be reached.

To undertake the assessment of the key year of 2028, the predicted noise contours for the Proposed Scheme are compared to the baseline condition. As the proposal is to vary a condition of the 2014 Planning Permission, it is considered relevant to use the baseline of 12.5 mppa in 2028, as was assumed for the 2012 ES (as updated with runway operation and population numbers). By undertaking this comparison, it is possible to analyse the effect as would have been identified in 2012 with this different condition (given necessary adjustments for the latest knowledge). For years prior to 2028 which encompass both the change to the Condition 10 and worst-case year, it is more appropriate to compare with what it is permissible currently, i.e. what is the actual effect that could be experienced at residences, assuming what is permissible with the existing Condition 10 contour area.

- 8.6.3 In summary, three non-variation scenarios are considered as a baseline for comparison:
- the extent of the existing Condition 10 for 2021 to 2027 inclusive, which provides a noise limit for airport 'in-air' operation;

¹³⁹ These contours relate to the Lowest Observable Adverse Effect Level, which is discussed in **Section 8.8**.

- the extent of the existing Condition 10 for 2028 onwards, which provides a future noise limit for airport in-air operation; and
- the 'without Proposed Scheme' 2028 scenario of 12.5 mppa as assessed in the 2014 Planning Permission 2012 ES but updated to take into account the latest knowledge of fleet mix and runway split.

Receptors

- 8.6.4 The closest residential areas to the airport are located to the west and south-west of Luton but there are more densely populated areas to the north. There are several small villages within relatively close proximity of LLA. Breachwood Green and Whitwell are located to the east and are affected by easterly departures and westerly arrivals. Residential areas to the west, such as Slip End, Caddington, Flamstead, and Markyate are affected by easterly arrivals or westerly departures. Due to the scale of the study areas the effect of aviation noise will be assessed in terms of dwellings in different noise contours rather than identifying noise at specific residential receptors.
- 8.6.5 The assessment considers the effect of the Proposed Scheme on the residents adversely affected, and significantly adversely affected, by the proposed variations, taking into account absolute levels of noise and the magnitude of change. Additional commentary is provided for other indicators, including N-contours and L_{Amax} levels.
- 8.6.6 Noise at non-residential receptors will be assessed; particularly education, healthcare, and religious centres are considered sensitive to increases in noise. Noise levels indicating thresholds for the onset of potentially significant effects for non-residential noise sensitive receptors are dependent on their use. The magnitude of change in noise is applied to assess significance on non-residential receptors.
- 8.6.7 The list of non-residential receptors presented in the 2014 Planning Permission 2012 ES have been reviewed and community locations which did not represent any non-residential noise sensitive receptors have been removed and the specific non-residential noise sensitive receptors identified. The receptors identified in **Table 8.5** are not exhaustive but relate to the closest modelled point.

Table 8.5 Non-residential noise sensitive receptors

Location	Receptors
Old Knebworth	Knebworth Country Park
Caddington	Caddington Village School, Heathfield Lower School
Park Town, Luton	The Linden Academy, Wonderland Day Care Nursery
Whitwell	St Paul's Walden Primary School, The Whitwell Surgery
Breachwood Green	Breachwood Green JMI School
St Pauls Walden	All Saints Church
Farley Hill, Luton	Stockwood Park Academy, St Margaret of Scotland Catholic Primary School
Slip End	Slip End Lower School
Harpenden	Roundwood Park School, King's School, Highfield's Pre-school, Manland Primary School, St George's School, Spire Harpenden Hospital
Walkern	Walkern Primary School

Location	Receptors
Stevenage (Eastern Perimeter)	Camps Hill Community School, Noble School, Lodge Farm Primary School
Stevenage Station	North Hertfordshire College
Luton (Wandon End)	Wigmore Park
Kensworth	Kensworth Primary School
Hudnall Corner	Hudnall Park
Flamstead	Flamstead School
Markyate	Markyate Village School & Nursery

Likely significant effects

- 8.6.8 The assessment considers the impact of the Proposed Scheme from the initial 2021 forecast with 18 mppa, upon which the amendment to Condition 10 is based. The following years are also assessed until 2024, which is the first year of increased throughput to 19 mppa. Based on the changing fleet mix with increased modernisation, these chosen scenario years show both the worst-case years for noise effect and how the noise levels start to decrease thereafter. A future year of 2028 is also assessed to understand the long-term effects of the Proposed Scheme in line with the original methodology within the 2014 Planning Permission 2012 ES.
- 8.6.9 This assessment is for airborne aircraft 'in-air' noise only, which is principally from aircraft arriving and landing and from aircraft taking-off and departing. 'In-air' aircraft noise that is considered in this assessment includes noise that occurs when, aircraft are on the runway:
- for start of take-off roll (SoR);
 - after landing;
 - when aircraft are rolling down the runway; and
 - when aircraft are using reverse thrust for braking.
- 8.6.10 Road traffic noise effects and aviation ground noise are not considered within this report as they have already been considered within the screening report (see **Appendix 1A** in **Volume 3: Figures and Appendices**) and have been shown not to have a significant effect. There are no construction works or operational building services plant to assess as there are no infrastructure requirements associated with the Proposed Scheme.

8.7 Environmental measures embedded into the Proposed Scheme

- 8.7.1 To ensure that noise levels decrease year on year the following commitments will be made as part of the Proposed Scheme:
- For Summer 2021 and all subsequent seasons, no night-time slots (22:00 to 05:59 GMT) will be allocated to aircraft with a quota count (QC) value greater than 1;
 - No further daytime slots will be allocated to aircraft with a QC value greater than 1 (06:00 to 21:59 GMT) between 1 June and 30 September;
 - No further night slots to be allocated to series flights (22:00-05:59 GMT) between 1 June and 30 September;

- No new slot applications with an aircraft QC value greater than 0.5 will be permitted between 22:00 and 05:59 GMT;
- Only scheduled arriving aircraft will be accepted between 04:45 and 06:00 GMT. All other arriving aircraft must land after 06:00 GMT, arrivals earlier than the scheduled arrival time will not be accepted; and
- No re-scheduling of existing allocated slots from the day time (06:00 to 21:59 GMT) into the night-time (22:00 to 05:59 GMT) 1 June – 30 September.

8.8 Assessment methodology

Approach

- 8.8.1 The assessment of effects in this chapter differs from the generic project-wide approach to the assessment methodology as set out in **Chapter 4: Approach to preparing the Environmental Statement**. The generic approach of comparing the Proposed Scheme with a baseline has informed this noise assessment. However, the identification of receptor sensitivity and magnitude is unnecessary as there exists in NPSE the framework for identifying significant effects on health, albeit the level by which this occurs is a matter of professional judgment.
- 8.8.2 Aircraft noise effects have been assessed by calculating and comparing predicted aircraft noise levels for the airport operating to the extent of the proposed variations against a selection of baseline scenarios as described in **Section 8.6**. As described in **Section 2.1**, in seeking to increase the passenger numbers to 19 mppa, Condition 10 needs to be varied both in the area limits up to 2027 inclusive and the area limits set for 2028 and onwards. The worst-case year for significant noise effects is not necessarily aligned with either the largest area contained within Condition 10 daytime or night-time contours 57 dB and 48 dB respectively or the years of maximum 19 mppa capacity. It is therefore necessary to analyse noise modelling results for a number of years between 2021 and 2028 to ascertain the years of highest impact in relation to significance and mitigation requirements.
- 8.8.3 The primary means of assessing aviation noise is by using the daytime (07:00 - 23:00) $L_{Aeq, 16hr}$ and night-time (23:00 - 07:00) $L_{Aeq, 8hr}$ metrics. The N65 and N60 contours and L_{Amax} contours have also been considered, but are only presented as additional information, so conclusions regarding significant effect have not been drawn from those results.

Assessment scenarios

- 8.8.4 Aviation noise described using the L_{Aeq} metric has been assessed using the following scenarios as discussed in **Section 8.6**:
- comparison of the 'with Proposed Scheme' scenarios: 2021 (with the amended Condition 10 limits), 2022, and 2023 18 mppa scenarios with the existing Condition 10 limits for 2021 - 2027 showing the short-term change in noise levels prior to the projected year that the 19 mppa would take effect
 - comparison of the 'with Proposed Scheme' 19 mppa 2024 scenario with the existing Condition 10 limits for 2021 - 2027 showing the short-term change in noise levels prior to the change in Condition 8.
 - comparison of the 2028 19 mppa scenario (with the amended Condition 10 limits) with the 2028 baseline ('without Proposed Scheme') 12.5 mppa scenario as would have been expected for the 2014 Planning Permission's ES (as assessed in the 2012 ES); and

- comparison of the 2028 19 mppa scenario (with the amended Condition 10 limits) with the existing Condition 10 limits for 2028 onwards for long-term effects.

Assessment criteria

- 8.8.5 Following government policy terminology¹⁴⁰, adverse effects can be detected from calculated noise at a residential receptor when between LOAEL and SOAEL, and significant adverse effects occur when above SOAEL. Reference to the NPSE criteria is made within this assessment and mitigation considered accordingly to minimise absolute levels of noise. However, determining whether, the difference between baseline scenarios and the Proposed Scheme, would be considered a significant effect is also dependent on the magnitude of change.

Assessment criteria for residential receptors

- 8.8.6 The aircraft noise thresholds shown in **Table 8.6** have been used within this assessment for residential receptors.

Table 8.6 Summary of aircraft noise thresholds for residential receptors

Period	Lowest Observed Adverse Effect Level (LOAEL)	Significant Observed Adverse Effect Level (SOAEL)	Unacceptable Adverse Effect Level (UAEL)
Day time (07:00 to 23:00)	51 dB $L_{Aeq,16hr}$	63 dB $L_{Aeq,16hr}$	71 dB $L_{Aeq,16hr}$
Night-time (23:00 to 07:00)	45 dB $L_{Aeq,8hr}$	55 dB $L_{Aeq,8hr}$	66 dB $L_{Aeq,8hr}$

Daytime aircraft noise

- 8.8.7 The airborne noise assessment method prescribed in the 2014 Planning Permission 2012 ES was based on noise policy contained in the withdrawn *Future of Air Transport White Paper* (ATWP)¹⁴¹. The 2014 Planning Permission 2012 ES therefore assessed amenity noise effects when aircraft noise exceeded 57 dB, 63 dB, and 69 dB $L_{Aeq,16hr}$ as endorsed in the White Paper.
- 8.8.8 For the purposes of this assessment, the daytime noise policy thresholds of 63 dB and 69 dB used for the 2014 Planning Permission 2012 ES have been retained; however consistent with updated airspace policy guidance, this assessment also considers noise above 51 dB $L_{Aeq,16hr}$.
- 8.8.9 The level of **71 dB $L_{Aeq,16hr}$** has been considered a suitable value for a daytime UAEL relating to 10 dB above BS 8233¹⁴² internal noise target levels assuming a precautionary outdoor to indoor noise level difference of 26 dB with windows closed¹⁴³.

¹⁴⁰ Department for Agriculture and Rural Affairs (2010). *Noise Policy Statement for England*. Available [online] at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69533/pb13750-noise-policy.pdf [Accessed 23 November 2020].

¹⁴¹ Department for Transport (2003). *The Future of Air Transport*. Available [online] at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/685595/6046.pdf [Accessed 23 November 2020].

¹⁴² British Standards Institution (BSI, 2014) *British Standard BS 8223:2014 Guidance on sound insulation and noise reduction for buildings*. London, BSI.

¹⁴³ This is based on the UAEL identified within the Heathrow Preliminary Environmental Information Report (PEIR), Appendix 7.1 Annex F: Overview of LOAEL, SOAEL and UAEL values (Heathrow Airport Limited, 2019), available at <https://aec.heathrowconsultation.com/wp->

- 8.8.10 The level of **63 dB $L_{Aeq,16hr}$** has been considered a suitable value for the SOAEL for the assessment of likely significant adverse effects and is based upon paragraphs 3.37-3.39 from the APF¹⁴⁴, which indicates that above 63 dB $L_{Aeq,16hr}$, airports should provide financial assistance towards noise insulation at noise-sensitive buildings and residential dwellings.
- 8.8.11 The level of **51 dB $L_{Aeq,16hr}$** has been considered a suitable value for LOAEL based on the Air Navigation Guidance (ANG, 2017)¹⁴⁵ which states that *"We [the Government] will set a LOAEL at 51 dB $L_{Aeq,16hr}$ for daytime noise"*.

Night-time aircraft noise

- 8.8.12 With regards to night-time aircraft noise, this was assessed in the 2014 Planning Permission 2012 ES according to the area of the 90 dB Sound Exposure Level (SEL) footprint¹⁴⁶ for the most frequently operated aircraft and the area of the 55 dB and the 48 dB $L_{Aeq,8hr}$ contour.
- 8.8.13 The level of **66 dB $L_{Aeq,8hr}$** has been considered a suitable value for a night-time UAEL relating to 10 dB above BS 8233¹⁴⁷ internal noise target levels assuming a precautionary outdoor to indoor noise level difference of 26 dB with windows closed¹⁴⁸.
- 8.8.14 For the purposes of this assessment, it is considered that a suitable value for the night-time SOAEL is **55 dB $L_{Aeq,8hr}$** . This is based on the WHO Night Noise Guidelines for Europe¹⁴⁹ 'interim target value' of 55 dB $L_{Aeq,8hr}$. The interim target is recommended by WHO for countries where the night noise guideline (NNG) of 40 dB cannot be achieved in the short-term for several reasons.
- 8.8.15 Consistent with updated policy and guidance this assessment considers **45 dB $L_{Aeq,8hr}$** as suitable value for LOAEL.

Assessment criteria for non-residential noise sensitive buildings

- 8.8.16 The threshold criteria for assessing the effect of the Proposed Scheme upon non-residential noise-sensitive receptors are presented in **Table 8.7**. A significant effect is potentially identified where the aircraft noise exceeds the relevant threshold; identified exceedances are then assessed using magnitude of change criteria.

[content/uploads/sites/5/2019/06/23-Volume-3-PEIR-Chapter-17-Noise-and-vibration-Appendices.pdf](#) [Accessed 23 November 2020], which itself refers to Figure 2 within ProPG: Planning & Noise. Professional Planning Guidance on Planning and Noise. New Residential Development (May 2017) available at <https://www.ioa.org.uk/sites/default/files/14720%20ProPG%20Main%20Document.pdf> [Accessed 23 November 2020].

¹⁴⁴ Department for Transport (2013). *Aviation Policy Framework*. Available [online] at <https://www.gov.uk/government/publications/aviation-policy-framework> [Accessed 23 November 2020].

¹⁴⁵ Department for Transport (2017) Air Navigation Guidance [online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/918507/air-navigation-guidance-2017.pdf [Accessed on 12 November 2020].

¹⁴⁶ Sound Exposure Level is the constant sound level that has the same amount of energy in one second as the original noise event.

¹⁴⁷ British Standards Institution (BSI, 2014), *Op. cit.*

¹⁴⁸ As per footnote 143, based on UAEL within Heathrow PEIR (2019) and ProPG (2017).

¹⁴⁹ The World Health Organisation, Night Noise Guidelines for Europe, 2009 [Available [online] at: http://www.euro.who.int/_data/assets/pdf_file/0017/43316/E92845.pdf] [Accessed 23 November 2020].

Table 8.7 Threshold criteria for establishing potentially significant effects on noise-sensitive non-residential receptors

Receptor(s)	Threshold criteria	
	Daytime (07:00-23:00)	Night-time (23:00-07:00)
Acoustical resources i.e. Auditoria; concert halls; sound recording, broadcast studios and theatres	50 dB $L_{Aeq, 16h}$ ¹	50 dB $L_{Aeq, 8h}$
Places of meeting for religious worship; courts; cinemas; lecture theatres; museums; small auditoria or halls	50 dB $L_{Aeq, 16h}$ ²	N/A
Healthcare facilities Including hospitals and out-patient clinics	50 dB $L_{Aeq, 16h}$	45 dB $L_{Aeq, 8h}$ ³
Hotels	50 dB $L_{Aeq, 16h}$	45 dB $L_{Aeq, 8h}$ ³
Educational facilities Including schools, colleges, and libraries	50 dB $L_{Aeq, 16h}$	N/A
Offices	55 dB $L_{Aeq, 16h}$ ⁴	N/A
External amenity spaces	55 dB $L_{Aeq, 16h}$ ⁵	N/A

1. Based on an internal level of 25 $L_{Aeq,T}$ consistent with BS 8233. To require these criteria the internal sound levels due to existing sources (internal and external) must already be reduced to these criteria or lower. Given typical environments this would suggest any such receptor would have a level of sound insulation from the building shell (including windows and ventilation penetrations) that would reduce external levels by at least 25 to 30 dB.

2. Based on an internal level of 35 dB $L_{Aeq,T}$ consistent with Building Bulletin 93 and BS 8233. Equivalent external level assuming 10-15 dB for a partially open window.

3. Based on an internal level of 30 dB $L_{Aeq,T}$ consistent with BS 8233, WHO guidelines. Equivalent external level assuming 10-15 dB for a partially open window.

4. Based on an internal level of 40 dB $L_{Aeq,T}$ consistent with BS 8233, BCO guidelines etc. Equivalent external level assuming 10-15 dB for a partially open window.

5. Based upon guidance from World Health Organization 'Guidelines for community noise'.

Magnitude of noise change criteria for residential and non-residential receptors

- 8.8.17 Where predicted aviation noise levels at residences exceed the LOAEL or SOAEL there is the potential for adverse or significant adverse effects, respectively. A notable exceedance of criteria is deemed to occur if aviation noise exceeds the LOAEL by at least 3.0 dB and the SOAEL by at least 1.0 dB.
- 8.8.18 For non-residential receptors, any increase of at least 1 dB where the noise level is above the threshold criteria would be considered a significant effect.
- 8.8.19 The approach takes account of the increasing severity of the effect when the SOAEL is exceeded. PPG-N¹⁵⁰ states that where existing noise sensitive locations already experience high noise levels, a development that is expected to cause even a small increase in the overall noise level may result in a significant adverse effect occurring. It is therefore considered appropriate to assign a greater degree of importance to noise change above the SOAEL.

¹⁵⁰ Ministry of Housing, Communities and Local Government, Planning Practice Guidance: Noise (2014) [Available online: <https://www.gov.uk/guidance/noise--2>] [Accessed 23 November 2020].

- 8.8.20 Where pertinent, additional factors are taken into account when determining adverse or significant adverse effects, such as the time over which the effect occurs and the context of the increases, and the increase or decrease in population (associated with dwellings) exposed at or above SOAEL.
- 8.8.21 Reductions in noise can provide a beneficial or significant beneficial effect.
- 8.8.22 Any increases or decreases less than the stated change above would result in a negligible effect.

N-Contours

- 8.8.23 There was no evidence from the findings within CAP 1506¹⁵¹ that suggested N65 or N70 contours correlated better with annoyance than $L_{Aeq,16hr}$ and there are no planning criteria available for the N65/N60 metrics.
- 8.8.24 The 'Number above' contours outline the extent of the area exposed to a certain L_{Amax} noise level a certain number of times per day. An 'N65, 200 contour' outlines the area exposed to at least 65 dB L_{Amax} at least 200 times per day. Due to the nature of these contours, they can be very sensitive to small changes in the movements used to produce them. For instance, if an airport had 190 movements per day it would have no N65, 200 contour, however this does not mean that the 190 movements do not have an impact. Equally if the airport had ten extra movements there would be an N65 200 contour, although any impact of the 10 extra movements is likely to be small.
- 8.8.25 Despite the potential issues, N-contours are considered to be informative indicators of the noise environment generated by aircraft in flight not fully expressed using the $L_{Aeq,T}$. As such, the N65 and N60 contours have been identified for both the current limit contours of the existing Condition 10 and the proposed Condition 10 limit contours, both short-term (as identified by 18 mppa 2021 forecasts) and long-term (19 mppa 2028 forecasts). The results of the N contours analysis is presented in **Appendix 8E** in **Volume 3: Figures and Appendices**.

L_{Amax} Assessment

- 8.8.26 The assessment of effects from maximum noise levels of aircraft movements have focused on the following:
- daytime disturbance of educational establishments with a potential onset of adverse effects of above 80 dB $L_{Amax, daytime}$. This is based on the design requirement within *Acoustic design of schools: Performance standards*¹⁵² for regular discrete noise events to not exceed 60 dB $L_{A1, 30}$ minutes. The external level is calculated by adding 15 dB for attenuation through a slightly open window and also a conservative estimation of the difference between L_{A1} and L_{Amax} of 5 dB for one event in 30 minutes. Schools and colleges are the most common sensitive non-residential receptor within identified receptors locations (as per **Table 8.5**).
 - night-time disturbance of sleep within health care and residences with a potential onset of adverse effects of above 80 dB $L_{Amax, night-time}$. This is based on research described within CAP 725¹⁵³ that referred to research showing a statistical relationship between sleep arousal rates and aviation noise of approximately 80 dB upwards.

¹⁵¹ Civil Aviation Authority, CAP 1506: Survey of noise attitudes 2014: Aircraft (2017) [Available online: <https://publicapps.caa.co.uk/modalapplication.aspx?appid=11&mode=detail&id=7744>] [Accessed 23 November 2020].

¹⁵² Department for Education, *Acoustic design of schools: performance standards* (Building bulletin 93), 2015. UK Government. Available [online] at: <https://www.gov.uk/government/publications/bb93-acoustic-design-of-schools-performance-standards> [Accessed 23 November 2020].

¹⁵³ Civil Aviation Authority, CAP 725: *Airspace Change Process Guidance Document* (2017) [Available [online] at: <https://publicapps.caa.co.uk/modalapplication.aspx?appid=11&mode=detail&id=395>] [Accessed 23 November 2020].

- 8.8.27 For non-residential receptors, computer noise modelling has been undertaken to predict noise from the loudest aircraft types at specific locations. For residences, L_{Amax} contours have been produced to provide an area (sq.km), number of dwellings and population included within various aircraft type noise contours. The data for the L_{Amax} predictions are presented in **Appendix 8E** in **Volume 3: Figures and Appendices**.
- 8.8.28 An appreciation of how L_{Amax} could either decrease or increase has been gathered by examining the change in forecasted ATMs as a result of the 19 mppa proposed variation and the fleet mix between older, louder planes and the new, quieter planes. Adverse effects would potentially be identified where there is an overall increase in the louder planes causing exposure above L_{Amax} 80 dB at noise sensitive receptors.
- 8.8.29 Recent non-compliance with Condition 10 (based on the $L_{Aeq, 16 \text{ hour}}$ and $L_{Aeq, 8 \text{ hour}}$) does not involve the L_{Amax} metric. Therefore, the L_{Amax} assessment is restricted to 19 mppa scenarios. Instead of the use of the existing Condition 10 noise levels, the L_{Amax} assessment compares the 19 mppa scenario with the 18 mppa scenarios for 2024 and 2028. Existing Condition 10 results are not based on forecasts and do not have the detail of fleet mix necessary upon which to compare in an L_{Amax} assessment.

8.9 Assessment of noise effects

Residential L_{Aeq} noise contour assessment

- 8.9.1 This section presents a discussion of the results, presented in full in **Appendix 8D** in **Volume 3: Figures and Appendices**, used to identify noise effects for the operation of LLA. The tables present the total area, dwellings and population encompassed by the contours pertaining to the relevant baseline and Proposed Scheme scenario. Tables are split into noise contours for the purposes of assessing effects on residences, and specific receptor locations in the community for the purposes of assessing effects on non-residential receptors. The tables identify the levels of interest; LOAEL, SOAEL, and existing Condition 10 limits.
- 8.9.2 Applying the change criteria in **Section 8.8**, the assessment is carried out in three steps by comparing the Proposed Scheme Scenarios with the baseline scenarios:
- identify whether there are changes of 3 dB or more between the LOAEL or SOAEL contour levels when comparing the 19 mppa and relevant baseline scenario;
 - identify whether there are changes of 1 dB or more within the SOAEL contour when comparing the 19 mppa and baseline scenario; and
 - identify any change in number of receptors exposed within the SOAEL contour in the 19 mppa scenarios.

General Comments

- 8.9.3 **Table 8.8** summarises the results with the numbers of dwellings above LOAEL, the 54 dB $L_{Aeq, 16hr}$ contour (the onset of significant annoyance) and SOAEL for the various baseline and Proposed Scheme scenarios. **Table 8.9** provides the difference between the key assessment years.
- 8.9.4 The results show more dwellings would be predicted to experience noise above the LOAEL, SOAEL, and level identified with the onset of significant annoyance for most scenarios from the Proposed Scheme. The exception to this is less dwellings are predicted to experience noise above SOAEL during the night-time when compared with the 12.5 mppa 2028 future baseline updated scenario.

- 8.9.5 The worst case-year for the number of dwellings above SOAEL is 2022, when 724 additional dwellings would be predicted to experience noise above SOAEL during the night-time with the Proposed Scheme in comparison with the existing Condition 10 limits. The number of additional dwellings above the night-time SOAEL remains constant until 2023 and then decreases thereafter.
- 8.9.6 No dwellings are predicted to be within the noise contour for UAEL for either daytime or night-time in any scenario.

Table 8.8 Number of dwellings within operational aviation noise contour levels in key assessment years ($L_{Aeq,T}$ dB)

Contour level ($L_{Aeq,T}$)	Number of dwellings							
	Existing Condition 10 noise contour (2021 - 2027)	2021 18 mppa Noise contour	2022 18 mppa Noise contour	2023 18 mppa Noise contour	2024 19 mppa Noise contour	Existing future Condition 10 noise contour (2028 onwards)	12.5 mppa future baseline 2028 Noise Contour	2028 19 mppa noise contour
Daytime contour level ($L_{Aeq,16hr}$)								
51	13,981	16,746	16,411	15,547	14,644	10,003	9,990	10,276
54	7,080	7,661	7,827	7,619	7,258	5,582	5,560	5,816
63	720	758	805	776	720	411	331	460
Night-time contour level ($L_{Aeq,8hr}$)								
45	19,490	25,426	24,906	24,815	22,328	15,597	16,706	19,637
55	1,184	1,790	1,908	1,908	1,742	1,012	1,406	1,385

Table 8.9 Comparisons of numbers of dwellings within operational aviation noise contour levels in key assessment years ($L_{Aeq,T}$ dB)

Contour level ($L_{Aeq,T}$)	Change in number of dwellings					
	2021 18 mppa increase on existing Condition 10 noise contour	2022 18 mppa increase on existing Condition 10 noise contour	2023 18 mppa increase on existing Condition 10 noise contour	2024 19 mppa increase on existing Condition 10 noise contour	2028 19 mppa increase on existing future Condition 10 noise contour	2028 19 mppa increase on 12.5 mppa future baseline 2028
Daytime contour level ($L_{Aeq,16hr}$)						
51	2,765	2,430	1,566	663	273	286
54	581	747	539	178	234	256
63	38	85	56	0	49	129
Night-time contour level ($L_{Aeq,8hr}$)						
45	5,936	5,416	5,325	2,838	4,040	2,931
55	606	724	724	558	373	-21

Comparison of noise change

- 8.9.7 **Table 8.10 to Table 8.21** show how the difference in number of dwellings between the Proposed Scheme scenarios and baseline scenarios relate to different noise contours to enable an assessment.
- 8.9.8 The numbers will not correlate with the numbers in **Table 8.8** or **Table 8.9** as they are based on different change parameters. Numbers in **Table 8.8** and **Table 8.9** are a comparison between total absolute values between scenarios (e.g. comparing total numbers of dwellings experiencing noise of 55 dB and higher) and **Table 8.10 to Table 8.21** are a comparison of changes in noise level between scenarios (e.g. comparing dwellings that would experience a change in noise levels of at least 1.0 to 1.9 dB within a noise contour range of 55.0 to 55.9 dB). It is therefore not possible to compare the 724 dwellings above SOAEL in the 2022 night-time in **Table 8.9** when looking at the dwellings within the 1-1.9 dB change bracket for noise contours of 55 dB and above in **Table 8.13**.

Table 8.10 Number of dwellings by change of daytime noise level (dB), per noise contour ($L_{Aeq,T}$ dB), as a result of comparing the 2021 18 mppa scenario with the existing Condition 10 noise limits for 2021 - 2027

Daytime $L_{Aeq,16hr}$	Change in noise level ($L_{Aeq,16hr}$ dB), daytime						
	<=-3	-2.9 to -2.0	-1.9 to -1.0	-0.9 to 0.9	1.0 to 1.9	2 to 2.9.0	>=3
51.0 to 51.9	0	0	0	4,178	0	0	0
52.0 to 52.9	0	0	0	2,989	0	0	0
53.0 to 53.9	0	0	0	1,916	2	0	0
54.0 to 54.9	0	0	0	822	0	0	0
55.0 to 55.9	0	0	0	1,267	0	0	0
56.0 to 56.9	0	0	0	842	0	0	0
57.0 to 57.9	0	0	0	781	0	0	0
58.0 to 58.9	0	0	0	692	0	0	0
59.0 to 59.9	0	0	0	1,117	0	0	0
60.0 to 60.9	0	0	0	539	0	0	0
61.0 to 61.9	0	0	0	595	0	0	0
62.0 to 62.9	0	0	0	248	0	0	0
63.0 to 63.9	0	0	0	199	0	0	0
64.0 to 64.9	0	0	0	161	0	0	0
65.0 to 65.9	0	0	0	387	0	0	0
66.0 to 66.9	0	0	0	2	0	0	0

Daytime $L_{Aeq,16hr}$	Change in noise level ($L_{Aeq,16hr}$ dB), daytime						
	≤ -3	-2.9 to -2.0	-1.9 to -1.0	-0.9 to 0.9	1.0 to 1.9	2 to 2.9.0	≥ 3
67.0 to 67.9	0	0	0	7	0	0	0
68.0 to 68.9	0	0	0	2	0	0	0

8.9.9 When comparing the 2021 18 mppa daytime noise levels with the existing Condition 10, the results show that there are no increases of more than 3 dB between the LOAEL (51 dB) and SOAEL (63 dB). Further, there are no increases of 1 dB or more for any residents experiencing noise above SOAEL. On this basis, **the effect of the Proposed Scheme during daytime of 2021 would not be significant.**

Table 8.11 Number of dwellings by change of night-time noise level (dB), per noise contour ($L_{Aeq,T}$ dB), as a result of comparing the 2021 18 mppa scenario with the existing Condition 10 noise limits for 2021 - 2027

Night-time $L_{Aeq,8hr}$	Change in noise level ($L_{Aeq,8hr}$ dB), night-time						
	≤ -3	-2.9 to -2.0	-1.9 to -1.0	-0.9 to 0.9	1.0 to 1.9	2 to 2.9.0	≥ 3
45.0 to 45.9	0	0	0	6,038	1,142	0	0
46.0 to 46.9	0	0	0	5,009	636	0	0
47.0 to 47.9	0	0	0	3,132	847	0	0
48.0 to 48.9	0	0	0	1,106	219	0	0
49.0 to 49.9	0	0	0	1,109	294	0	0
50.0 to 50.9	0	0	0	554	385	0	0
51.0 to 51.9	0	0	0	795	144	0	0
52.0 to 52.9	0	0	0	594	92	0	0
53.0 to 53.9	0	0	0	815	132	0	0
54.0 to 54.9	0	0	0	398	195	0	0
55.0 to 55.9	0	0	0	640	138	0	0
56.0 to 56.9	0	0	0	227	0	0	0
57.0 to 57.9	0	0	0	197	0	0	0
58.0 to 58.9	0	0	0	128	0	0	0
59.0 to 59.9	0	0	0	309	6	0	0
60.0 to 60.9	0	0	0	135	0	0	0
61.0 to 61.9	0	0	0	1	0	0	0
62.0 to 62.9	0	0	0	9	0	0	0

Night-time $L_{Aeq,8hr}$	Change in noise level ($L_{Aeq, 8hr}$ dB), night-time						
	≤ -3	-2.9 to -2.0	-1.9 to -1.0	-0.9 to 0.9	1.0 to 1.9	2 to 2.9.0	≥ 3
63.0 to 63.9	0	0	0	0	0	0	0
64.0 to 64.9	0	0	0	0	0	0	0
65.0 to 65.9	0	0	0	0	0	0	0

8.9.10 When comparing the 2021 18 mppa night-time noise levels with the existing Condition 10, the results show that there are no increases of more than 3 dB between the LOAEL (45 dB) and SOAEL (55 dB). However, there are increases of 1 - 1.9 dB for residents in 144 dwellings experiencing noise above SOAEL. On this basis, **the effect of the Proposed Scheme during night-time of 2021 would be significant.**

Table 8.12 Number of dwellings by change of daytime noise level (dB), per noise contour ($L_{Aeq, T}$ dB), as a result of comparing the 2022 18 mppa scenario with the existing Condition 10 noise limits for 2021 - 2027

Daytime $L_{Aeq,16hr}$	Change in noise level ($L_{Aeq, 16hr}$ dB), daytime						
	≤ -3	-2.9 to -2.0	-1.9 to -1.0	-0.9 to 0.9	1.0 to 1.9	2 to 2.9.0	≥ 3
51.0 to 51.9	0	0	0	3,926	0	0	0
52.0 to 52.9	0	0	0	2,939	0	0	0
53.0 to 53.9	0	0	0	1,719	0	0	0
54.0 to 54.9	0	0	0	907	0	0	0
55.0 to 55.9	0	0	0	1,291	0	0	0
56.0 to 56.9	0	0	0	870	0	0	0
57.0 to 57.9	0	0	0	703	0	0	0
58.0 to 58.9	0	0	0	756	0	0	0
59.0 to 59.9	0	0	0	929	0	0	0
60.0 to 60.9	0	0	0	713	0	0	0
61.0 to 61.9	0	0	0	554	0	0	0
62.0 to 62.9	0	0	0	299	0	0	0
63.0 to 63.9	0	0	0	156	0	0	0
64.0 to 64.9	0	0	0	251	0	0	0
65.0 to 65.9	0	0	0	387	0	0	0
66.0 to 66.9	0	0	0	2	0	0	0

Daytime $L_{Aeq,16hr}$	Change in noise level ($L_{Aeq, 16hr}$ dB), daytime						
	≤ -3	-2.9 to -2.0	-1.9 to -1.0	-0.9 to 0.9	1.0 to 1.9	2 to 2.9.0	≥ 3
67.0 to 67.9	0	0	0	5	0	0	0
68.0 to 68.9	0	0	0	4	0	0	0

8.9.11 When comparing the 2022 18 mppa daytime noise levels with the existing Condition 10, the results show that there are no increases of more than 3 dB between the LOAEL (51 dB) and SOAEL (63 dB). Further, there are no increases of 1 dB or more for any residents experiencing noise above SOAEL. On this basis, **the effect of the Proposed Scheme during day time of 2022 would not be significant.**

Table 8.13 Number of dwellings by change of night-time noise level (dB), per noise contour ($L_{Aeq,T}$ dB), as a result of comparing the 2022 18 mppa scenario with the existing Condition 10 noise limits for 2021 - 2027

Night-time $L_{Aeq,8hr}$	Change in noise level ($L_{Aeq, 8hr}$ dB), night-time						
	≤ -3	-2.9 to -2.0	-1.9 to -1.0	-0.9 to 0.9	1.0 to 1.9	2 to 2.9.0	≥ 3
45.0 to 45.9	0	0	0	4,315	1,957	0	0
46.0 to 46.9	0	0	0	3,841	1,985	0	0
47.0 to 47.9	0	0	0	1,880	1,641	0	0
48.0 to 48.9	0	0	0	587	1,122	0	0
49.0 to 49.9	0	0	0	417	705	0	0
50.0 to 50.9	0	0	0	275	860	0	0
51.0 to 51.9	0	0	0	177	629	0	0
52.0 to 52.9	0	0	0	147	627	0	0
53.0 to 53.9	0	0	0	180	695	0	0
54.0 to 54.9	0	0	0	251	707	0	0
55.0 to 55.9	0	0	0	6	522	0	0
56.0 to 56.9	0	0	0	0	494	0	0
57.0 to 57.9	0	0	0	0	164	0	0
58.0 to 58.9	0	0	0	2	191	0	0
59.0 to 59.9	0	0	0	6	198	0	0
60.0 to 60.9	0	0	0	16	299	0	0
61.0 to 61.9	0	0	0	1	0	0	0

Night-time $L_{Aeq,8hr}$	Change in noise level ($L_{Aeq,8hr}$ dB), night-time						
	≤ -3	-2.9 to -2.0	-1.9 to -1.0	-0.9 to 0.9	1.0 to 1.9	2 to 2.9.0	≥ 3
62.0 to 62.9	0	0	0	0	9	0	0
63.0 to 63.9	0	0	0	0	0	0	0
64.0 to 64.9	0	0	0	0	0	0	0
65.0 to 65.9	0	0	0	0	0	0	0

8.9.12 When comparing the 2022 18 mppa night-time noise levels with the existing Condition 10, the results show that there are no increases of more than 3 dB between the LOAEL (45 dB) and SOAEL (55 dB). However, there are increases of 1 - 1.9 dB for residents in 1,877 dwellings experiencing noise above SOAEL. On this basis, **the effect of the Proposed Scheme during night-time of 2022 would be significant.**

Table 8.14 Number of dwellings by change of daytime noise level (dB), per noise contour ($L_{Aeq,T}$ dB), as a result of comparing the 2023 18 mppa scenario with the existing Condition 10 noise limits for 2021 - 2027

Daytime $L_{Aeq,16hr}$	Change in noise level ($L_{Aeq,16hr}$ dB), daytime						
	≤ -3	-2.9 to -2.0	-1.9 to -1.0	-0.9 to 0.9	1.0 to 1.9	2 to 2.9.0	≥ 3
51.0 to 51.9	0	0	0	3,712	0	0	0
52.0 to 52.9	0	0	0	2,533	0	0	0
53.0 to 53.9	0	0	0	1,683	0	0	0
54.0 to 54.9	0	0	0	883	0	0	0
55.0 to 55.9	0	0	0	1,348	0	0	0
56.0 to 56.9	0	0	0	666	0	0	0
57.0 to 57.9	0	0	0	781	0	0	0
58.0 to 58.9	0	0	0	711	0	0	0
59.0 to 59.9	0	0	0	1,020	0	0	0
60.0 to 60.9	0	0	0	629	0	0	0
61.0 to 61.9	0	0	0	528	0	0	0
62.0 to 62.9	0	0	0	277	0	0	0
63.0 to 63.9	0	0	0	217	0	0	0
64.0 to 64.9	0	0	0	163	0	0	0
65.0 to 65.9	0	0	0	385	0	0	0

Daytime $L_{Aeq,16hr}$	Change in noise level ($L_{Aeq,16hr}$ dB), daytime						
	≤ -3	-2.9 to -2.0	-1.9 to -1.0	-0.9 to 0.9	1.0 to 1.9	2 to 2.9.0	≥ 3
66.0 to 66.9	0	0	0	2	0	0	0
67.0 to 67.9	0	0	0	5	0	0	0
68.0 to 68.9	0	0	0	4	0	0	0

8.9.13 When comparing the 2023 18 mppa day time noise levels with the existing Condition 10, the results show that there are no increases of more than 3 dB between the LOAEL (51 dB) and SOAEL (63 dB). Further, there are no increases of 1 dB or more for any residents experiencing noise above SOAEL. On this basis, **the effect of the Proposed Scheme during daytime of 2023 would not be significant.**

Table 8.15 Number of dwellings by change of night-time noise level (dB), per noise contour ($L_{Aeq,T}$ dB), as a result of comparing the 2023 18 mppa scenario with the existing Condition 10 noise limits for 2021 - 2027

Night-time $L_{Aeq,8hr}$	Change in noise level ($L_{Aeq,8hr}$ dB), night-time						
	≤ -3	-2.9 to -2.0	-1.9 to -1.0	-0.9 to 0.9	1.0 to 1.9	2 to 2.9.0	≥ 3
45.0 to 45.9	0	0	0	4,376	1,957	0	0
46.0 to 46.9	0	0	0	3,812	1,878	0	0
47.0 to 47.9	0	0	0	1,917	1,641	0	0
48.0 to 48.9	0	0	0	596	1,089	0	0
49.0 to 49.9	0	0	0	415	870	0	0
50.0 to 50.9	0	0	0	266	677	0	0
51.0 to 51.9	0	0	0	177	629	0	0
52.0 to 52.9	0	0	0	147	627	0	0
53.0 to 53.9	0	0	0	228	695	0	0
54.0 to 54.9	0	0	0	203	707	0	0
55.0 to 55.9	0	0	0	6	522	0	0
56.0 to 56.9	0	0	0	0	494	0	0
57.0 to 57.9	0	0	0	0	164	0	0
58.0 to 58.9	0	0	0	2	191	0	0
59.0 to 59.9	0	0	0	19	198	0	0
60.0 to 60.9	0	0	0	3	299	0	0

Night-time $L_{Aeq,8hr}$	Change in noise level ($L_{Aeq,8hr}$ dB), night-time						
	≤ -3	-2.9 to -2.0	-1.9 to -1.0	-0.9 to 0.9	1.0 to 1.9	2 to 2.9.0	≥ 3
61.0 to 61.9	0	0	0	1	0	0	0
62.0 to 62.9	0	0	0	0	9	0	0
63.0 to 63.9	0	0	0	0	0	0	0
64.0 to 64.9	0	0	0	0	0	0	0
65.0 to 65.9	0	0	0	0	0	0	0

8.9.14 When comparing the 2023 18 mppa night-time noise levels with the existing Condition 10, the results show that there are no increases of more than 3 dB between the LOAEL (45 dB) and SOAEL (55 dB). However, there are increases of 1 - 1.9 dB for residents in 1,877 dwellings experiencing noise above SOAEL. On this basis, **the effect of the Proposed Scheme during night-time of 2023 would be significant.**

Table 8.16 Number of dwellings by change of day time noise level (dB), per noise contour ($L_{Aeq,T}$ dB), as a result of comparing the 2024 19 mppa scenario with the existing Condition 10 noise limits for 2021 - 2027

Daytime $L_{Aeq,16hr}$	Change in noise level ($L_{Aeq,16hr}$ dB), daytime						
	≤ -3	-2.9 to -2.0	-1.9 to -1.0	-0.9 to 0.9	1.0 to 1.9	2 to 2.9.0	≥ 3
51.0 to 51.9	0	0	0	3,587	0	0	0
52.0 to 52.9	0	0	0	2,453	0	0	0
53.0 to 53.9	0	0	0	1,346	0	0	0
54.0 to 54.9	0	0	0	806	0	0	0
55.0 to 55.9	0	0	0	1,265	0	0	0
56.0 to 56.9	0	0	0	620	0	0	0
57.0 to 57.9	0	0	0	836	0	0	0
58.0 to 58.9	0	0	0	883	0	0	0
59.0 to 59.9	0	0	0	882	0	0	0
60.0 to 60.9	0	0	0	440	0	0	0
61.0 to 61.9	0	0	0	644	0	0	0
62.0 to 62.9	0	0	0	162	0	0	0
63.0 to 63.9	0	0	0	198	0	0	0
64.0 to 64.9	0	0	0	206	0	0	0

Daytime $L_{Aeq,16hr}$	Change in noise level ($L_{Aeq,16hr}$ dB), daytime						
	≤ -3	-2.9 to -2.0	-1.9 to -1.0	-0.9 to 0.9	1.0 to 1.9	2 to 2.9.0	≥ 3
65.0 to 65.9	0	0	0	307	0	0	0
66.0 to 66.9	0	0	0	0	0	0	0
67.0 to 67.9	0	0	0	9	0	0	0
68.0 to 68.9	0	0	0	0	0	0	0

8.9.15 When comparing the 2024 19 mppa day time noise levels with the existing Condition 10, the results show that there are no increases of more than 3 dB between the LOAEL (51 dB) and SOAEL (63 dB). Further, there are no increases of 1 dB or more for any residents experiencing noise above SOAEL. On this basis, **the effect of the Proposed Scheme during daytime of 2024 would not be significant.**

Table 8.17 Number of dwellings by change of night-time noise level (dB), per noise contour ($L_{Aeq,T}$ dB), as a result of comparing the 2024 19 mppa scenario with the existing Condition 10 noise limits for 2021 - 2027

Night-time $L_{Aeq,8hr}$	Change in noise level ($L_{Aeq,8hr}$ dB), night-time						
	≤ -3	-2.9 to -2.0	-1.9 to -1.0	-0.9 to 0.9	1.0 to 1.9	2 to 2.9.0	≥ 3
45.0 to 45.9	0	0	0	4,739	1,195	0	0
46.0 to 46.9	0	0	0	4,254	1,084	0	0
47.0 to 47.9	0	0	0	1,864	761	0	0
48.0 to 48.9	0	0	0	522	634	0	0
49.0 to 49.9	0	0	0	611	748	0	0
50.0 to 50.9	0	0	0	380	562	0	0
51.0 to 51.9	0	0	0	287	599	0	0
52.0 to 52.9	0	0	0	112	581	0	0
53.0 to 53.9	0	0	0	262	603	0	0
54.0 to 54.9	0	0	0	224	564	0	0
55.0 to 55.9	0	0	0	81	403	0	0
56.0 to 56.9	0	0	0	6	441	0	0
57.0 to 57.9	0	0	0	27	64	0	0
58.0 to 58.9	0	0	0	8	243	0	0
59.0 to 59.9	0	0	0	68	256	0	0

Night-time $L_{Aeq,8hr}$	Change in noise level ($L_{Aeq,8hr}$ dB), night-time						
	≤ -3	-2.9 to -2.0	-1.9 to -1.0	-0.9 to 0.9	1.0 to 1.9	2 to 2.9.0	≥ 3
60.0 to 60.9	0	0	0	74	61	0	0
61.0 to 61.9	0	0	0	6	0	0	0
62.0 to 62.9	0	0	0	2	2	0	0
63.0 to 63.9	0	0	0	0	0	0	0
64.0 to 64.9	0	0	0	0	0	0	0
65.0 to 65.9	0	0	0	0	0	0	0

8.9.16 When comparing the 2024 19 mppa night-time noise levels with the existing Condition 10, the results show that there are no increases of more than 3 dB between the LOAEL (45 dB) and SOAEL (55 dB). However, there are increases of 1 - 1.9 dB for residents in 1,470 dwellings experiencing noise above SOAEL. On this basis, **the effect of the Proposed Scheme during night-time of 2024 would be significant.**

Table 8.18 Number of dwellings by change of daytime noise level (dB), per noise contour ($L_{Aeq,T}$ dB), as a result of comparing the 2028 19 mppa scenario with the existing future Condition 10 noise limits for 2028

Daytime $L_{Aeq,16hr}$	Change in noise level ($L_{Aeq,16hr}$ dB), daytime						
	≤ -3	-2.9 to -2.0	-1.9 to -1.0	-0.9 to 0.9	1.0 to 1.9	2 to 2.9.0	≥ 3
51.0 to 51.9	0	0	0	2,065	0	0	0
52.0 to 52.9	0	0	0	1,075	0	0	0
53.0 to 53.9	0	0	0	1,320	0	0	0
54.0 to 54.9	0	0	0	931	0	0	0
55.0 to 55.9	0	0	0	756	0	0	0
56.0 to 56.9	0	0	0	789	0	0	0
57.0 to 57.9	0	0	0	834	0	0	0
58.0 to 58.9	0	0	0	790	0	0	0
59.0 to 59.9	0	0	0	547	0	0	0
60.0 to 60.9	0	0	0	362	0	0	0
61.0 to 61.9	0	0	0	87	0	0	0
62.0 to 62.9	0	0	0	260	0	0	0
63.0 to 63.9	0	0	0	317	0	0	0

Daytime $L_{Aeq,16hr}$	Change in noise level ($L_{Aeq,16hr}$ dB), daytime						
	≤ -3	-2.9 to -2.0	-1.9 to -1.0	-0.9 to 0.9	1.0 to 1.9	2 to 2.9.0	≥ 3
64.0 to 64.9	0	0	0	133	0	0	0
65.0 to 65.9	0	0	0	6	0	0	0
66.0 to 66.9	0	0	0	4	0	0	0
67.0 to 67.9	0	0	0	0	0	0	0
68.0 to 68.9	0	0	0	0	0	0	0

8.9.17 When comparing the 2028 19 mppa daytime noise levels with the existing future Condition 10, the results show that there are no increases of more than 3 dB between the LOAEL (51 dB) and SOAEL (63 dB). In addition, there are no increases of 1 dB or more for any residents experiencing noise above SOAEL. **On this basis, the effect of the Proposed Scheme during daytime of 2028 would not be significant.**

Table 8.19 Number of dwellings by change of night-time noise level (dB), per noise contour ($L_{Aeq,T}$ dB), as a result of comparing the 2028 19 mppa scenario with the existing future Condition 10 noise limits in 2028

Night-time $L_{Aeq,8hr}$	Change in noise level ($L_{Aeq,8hr}$ dB), night-time						
	≤ -3	-2.9 to -2.0	-1.9 to -1.0	-0.9 to 0.9	1.0 to 1.9	2 to 2.9.0	≥ 3
45.0 to 45.9	0	0	0	5,876	0	0	0
46.0 to 46.9	0	0	0	4,253	0	0	0
47.0 to 47.9	0	0	0	1,884	0	0	0
48.0 to 48.9	0	0	0	1,479	0	0	0
49.0 to 49.9	0	0	0	924	0	0	0
50.0 to 50.9	0	0	0	719	0	0	0
51.0 to 51.9	0	0	0	958	0	0	0
52.0 to 52.9	0	0	0	759	0	0	0
53.0 to 53.9	0	0	0	894	0	0	0
54.0 to 54.9	0	0	0	506	0	0	0
55.0 to 55.9	0	0	0	499	0	0	0
56.0 to 56.9	0	0	0	164	0	0	0
57.0 to 57.9	0	0	0	212	0	0	0
58.0 to 58.9	0	0	0	246	0	0	0

Night-time $L_{Aeq,8hr}$	Change in noise level ($L_{Aeq,8hr}$ dB), night-time						
	≤ -3	-2.9 to -2.0	-1.9 to -1.0	-0.9 to 0.9	1.0 to 1.9	2 to 2.9.0	≥ 3
59.0 to 59.9	0	0	0	252	0	0	0
60.0 to 60.9	0	0	0	2	0	0	0
61.0 to 61.9	0	0	0	10	0	0	0
62.0 to 62.9	0	0	0	0	0	0	0
63.0 to 63.9	0	0	0	0	0	0	0
64.0 to 64.9	0	0	0	0	0	0	0
65.0 to 65.9	0	0	0	0	0	0	0

8.9.18 When comparing the 2028 19 mppa night-time noise levels with the existing future Condition 10, the results show that there are no increases of more than 3 dB between the LOAEL (45 dB) and SOAEL (55 dB). In addition, there are no increases of 1 dB or more for any residents experiencing noise above SOAEL. **On this basis, the effect of the Proposed Scheme during night-time of 2028 would not be significant.**

Table 8.20 Number of dwellings by change of daytime noise level (dB), per noise contour ($L_{Aeq,T}$ dB), as a result of comparing the 2028 19 mppa scenario with the 12.5 mppa updated 2028 future baseline

Daytime $L_{Aeq,16hr}$	Change in noise level ($L_{Aeq,16hr}$ dB), daytime						
	≤ -3	-2.9 to -2.0	-1.9 to -1.0	-0.9 to 0.9	1.0 to 1.9	2 to 2.9.0	≥ 3
51.0 to 51.9	0	0	0	2,065	0	0	0
52.0 to 52.9	0	0	0	1,075	0	0	0
53.0 to 53.9	0	0	0	1,320	0	0	0
54.0 to 54.9	0	0	0	931	0	0	0
55.0 to 55.9	0	0	0	756	0	0	0
56.0 to 56.9	0	0	0	789	0	0	0
57.0 to 57.9	0	0	0	834	0	0	0
58.0 to 58.9	0	0	0	790	0	0	0
59.0 to 59.9	0	0	0	547	0	0	0
60.0 to 60.9	0	0	0	362	0	0	0
61.0 to 61.9	0	0	0	87	0	0	0
62.0 to 62.9	0	0	0	260	0	0	0

Daytime $L_{Aeq,16hr}$	Change in noise level ($L_{Aeq,16hr}$ dB), daytime						
	≤ -3	-2.9 to -2.0	-1.9 to -1.0	-0.9 to 0.9	1.0 to 1.9	2 to 2.9.0	≥ 3
63.0 to 63.9	0	0	0	317	0	0	0
64.0 to 64.9	0	0	0	133	0	0	0
65.0 to 65.9	0	0	0	6	0	0	0
66.0 to 66.9	0	0	0	4	0	0	0
67.0 to 67.9	0	0	0	0	0	0	0
68.0 to 68.9	0	0	0	0	0	0	0

8.9.19 When comparing the 2028 19 mppa daytime noise levels with the 12.5 mppa future baseline for 2028, the results show that there are no increases of more than 3 dB between the LOAEL (51 dB) and SOAEL (63 dB). Further, there are no increases of 1 dB or more for any residents experiencing noise above SOAEL. **On this basis, the effect of the Proposed Scheme during daytime of 2028 would not be significant.**

Table 8.21 Number of dwellings by change of night-time noise level (dB), per noise contour ($L_{Aeq,T}$ dB), as a result of comparing the 2028 19 mppa scenario with the 12.5mppa updated 2028 future baseline

Night-time $L_{Aeq,16hr}$	Change in noise level ($L_{Aeq,8hr}$ dB), night-time						
	≤ -3	-2.9 to -2.0	-1.9 to -1.0	-0.9 to 0.9	1.0 to 1.9	2 to 2.9.0	≥ 3
45.0 to 45.9	0	0	0	3,666	2,210	0	0
46.0 to 46.9	0	0	0	2,657	1,596	0	0
47.0 to 47.9	0	0	0	1,796	88	0	0
48.0 to 48.9	0	0	0	1,479	0	0	0
49.0 to 49.9	0	0	0	924	0	0	0
50.0 to 50.9	0	0	0	719	0	0	0
51.0 to 51.9	0	0	89	869	0	0	0
52.0 to 52.9	0	0	247	512	0	0	0
53.0 to 53.9	0	0	78	816	0	0	0
54.0 to 54.9	0	0	0	506	0	0	0
55.0 to 55.9	0	0	0	499	0	0	0

Night-time $L_{Aeq,16hr}$	Change in noise level ($L_{Aeq,8hr}$ dB), night-time						
	≤ -3	-2.9 to -2.0	-1.9 to -1.0	-0.9 to 0.9	1.0 to 1.9	2 to 2.9.0	≥ 3
56.0 to 56.9	0	0	0	164	0	0	0
57.0 to 57.9	0	0	0	212	0	0	0
58.0 to 58.9	0	0	0	246	0	0	0
59.0 to 59.9	0	0	0	252	0	0	0
60.0 to 60.9	0	0	0	2	0	0	0
61.0 to 61.9	0	0	0	10	0	0	0
62.0 to 62.9	0	0	0	0	0	0	0
63.0 to 63.9	0	0	0	0	0	0	0
64.0 to 64.9	0	0	0	0	0	0	0
65.0 to 65.9	0	0	0	0	0	0	0

8.9.20 When comparing the 2028 19 mppa night-time noise levels with the 12.5 mppa future baseline for 2028, the results show that there are no increases of more than 3 dB between the LOAEL (45 dB) and SOAEL (55 dB). Further, there are no increases of 1 dB or more for any residents experiencing noise above SOAEL. **On this basis, the effect of the Proposed Scheme during night-time of 2028 would not be significant.**

8.9.21 **Table 8.22** provides a summary of the findings of the above tables, showing the peak of effect from the Proposed Scheme in 2022 and 2023, with this effect reducing thereafter. By 2028, the Proposed Scheme would have **no significant adverse effect on residences**.

Table 8.22 Threshold criteria for establishing potentially significant effects on noise-sensitive residential receptors

Adverse effect level	Population number significantly affected by Proposed Scheme (based on magnitude increase and noise level above effect level) for different scenario assessments					
	2021 18 mppa increase on existing Condition 10 noise contour	2022 18 mppa increase on existing Condition 10 noise contour	2023 18 mppa increase on existing Condition 10 noise contour	2024 19 mppa increase on existing Condition 10 noise contour	2028 19 mppa increase on existing future Condition 10 noise contour	2028 19 mppa increase on 12.5 mppa future baseline 2028
Day time						
LOAEL	0	0	0	0	0	0
SOAEL	0	0	0	0	0	0

Adverse effect level	Population number significantly affected by Proposed Scheme (based on magnitude increase and noise level above effect level) for different scenario assessments					
	2021 18 mppa increase on existing Condition 10 noise contour	2022 18 mppa increase on existing Condition 10 noise contour	2023 18 mppa increase on existing Condition 10 noise contour	2024 19 mppa increase on existing Condition 10 noise contour	2028 19 mppa increase on existing future Condition 10 noise contour	2028 19 mppa increase on 12.5 mppa future baseline 2028
Night-time						
LOAEL	0	0	0	0	0	0
SOAEL	144	1,877	1,877	1,470	0	0

8.10 Non-residential receptors L_{Aeq} assessment

8.10.1

Table 8.23 shows the predicted noise levels for the various Proposed Scheme and baseline scenarios and **Table 8.24** shows the differences within the identified comparisons of interest. The results show that there would be changes of 1 dB or more above the threshold criteria (i.e., changes of 1 dB or more below the threshold criteria are not considered significant) at Caddington (schools), Park Town (academy, nursery), Breachwood Green (school), St Pauls Walden (church), Slip End (school) and at Stevenage Station (college), (highlighted red in **Table 8.24** where relevant, e.g. night-time levels are not pertinent for schools). These significant effects are mainly predicted in 2022, except for ongoing significant effects in Park Town, Luton to 2024 and at Slip End to 2023. **On this basis, the effect of the Proposed Scheme would be significant at these locations.** For the avoidance of doubt, **Table 8.24** identifies where significant effects have been identified.

Table 8.23 Noise levels ($L_{Aeq,T}$ dB) predicted for Proposed Scheme and baseline scenarios for non-residential receptors

Location	Noise levels ($L_{Aeq,T}$ dB) predicted at non-residential receptors															
	Existing Condition 10 years 2021- 2027		2021 18 mppa		2022 18 mppa		2023 18 mppa		2024 19 mppa		Existing Condition 10 years 2028+		2028 12.5 mppa revised future baseline		2028 19 mppa	
	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
Old Knebworth Lodge Farm	44	38	45	39	44	39	44	39	44	39	42	37	43	38	42	38
Caddington	54	50	55	51	55	51	54	50	54	50	54	49	54	49	54	50
Park Town, Luton	60	54	61	55	61	56	61	56	61	55	59	54	59	55	59	55
Whitwell	47	42	48	43	48	43	47	43	47	42	46	41	46	42	46	42
Breachwood Green	54	49	55	50	55	50	54	50	54	50	53	49	53	49	53	49
St Pauls Walden	53	49	54	49	54	49	54	49	53	49	52	48	53	48	53	48
Farley Hill School Luton	49	43	50	44	50	44	49	44	49	44	48	43	48	43	48	43
Slip End	60	54	61	55	61	55	60	55	60	55	59	53	59	55	59	54
Harpenden Children's Home	39	34	40	35	40	34	40	34	39	34	38	33	38	33	38	33
Walkern	46	42	47	43	46	43	46	42	46	42	46	41	46	41	46	42

Location	Noise levels (L _{Aeq, T} dB) predicted at non-residential receptors															
	Existing Condition 10 years 2021- 2027		2021 18 mppa		2022 18 mppa		2023 18 mppa		2024 19 mppa		Existing Condition 10 years 2028+		2028 12.5 mppa revised future baseline		2028 19 mppa	
	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
Stevenage (Eastern Perimeter)	49	45	49	45	49	45	49	45	49	45	48	44	48	43	48	44
Stevenage Station	52	48	53	49	53	49	52	49	52	48	52	47	52	47	52	48
Luton (Wandon End)	54	48	54	49	54	49	54	49	54	48	52	47	52	48	52	48
Kensworth	50	46	50	46	50	46	50	46	50	46	49	45	49	45	49	46
Hudnall Corner	46	41	48	43	48	42	47	42	47	42	46	40	46	41	46	41
Flamstead	51	45	51	46	51	45	51	45	50	45	49	43	49	45	49	44
Markyate	53	47	53	48	53	48	53	48	53	47	51	46	52	47	51	46

Table 8.24 Differences in noise level ($L_{Aeq,T}$ dB) predicted between Proposed Scheme and baseline scenarios for non-residential receptors

Location	2021 18 mppa minus existing Condition 10		2022 18 mppa minus existing Condition 10		2023 18 mppa minus existing Condition 10		2024 19 mppa minus existing Condition 10		2028 19 mppa minus existing future Condition 10		2028 19 mppa minus 12.5 mppa future baseline		Significant
	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	
Old Knebworth Lodge Farm	0.3	0.9	0.0	1.0	0	1.0	0.0	1.0	0.1	0.7	-0.2	-0.4	No
Caddington	0.5	0.7	1.0	1.0	0.0	0.0	0.0	0.0	0.1	0.7	-0.1	0.6	Yes
Park Town, Luton	0.7	0.8	1.0	2.0	1.0	2.0	1.0	1.0	0.1	0.7	0.6	-0.1	Yes
Whitwell	0.5	0.9	1.0	1.0	0.0	1.0	0.0	0.0	0.1	0.7	-0.2	0.2	No
Breachwood Green	0.5	0.8	1.0	1.0	0.0	1.0	0.0	1.0	0.1	0.6	-0.1	0.4	Yes
St Pauls Walden	0.5	0.8	1.0	0.0	1.0	0.0	0.0	0.0	0.1	0.7	-0.1	0.5	Yes
Farley Hill School Luton	0.6	0.8	1.0	1.0	0.0	1.0	0.0	1.0	0.1	0.6	0.2	0.0	No
Slip End	0.7	1.0	1.0	1.0	0.0	1.0	0.0	1.0	0.1	0.7	-0.2	-1.1	Yes
Harpenden Children's Home	0.9	1.1	1.0	0.0	1.0	0.0	0.0	0.0	0.1	0.6	0.1	-0.2	No
Walkern	0.5	0.7	0.0	1.0	0.0	0.0	0.0	0.0	0.1	0.6	0.1	1.2	No
Stevenage (Eastern Perimeter)	0.5	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.6	0.1	1.1	No

Location	2021 18 mppa minus existing Condition 10		2022 18 mppa minus existing Condition 10		2023 18 mppa minus existing Condition 10		2024 19 mppa minus existing Condition 10		2028 19 mppa minus existing future Condition 10		2028 19 mppa minus 12.5 mppa future baseline		Significant
	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	
Stevenage Station	0.4	0.7	1.0	1.0	0.0	1.0	0.0	0.0	0.1	0.7	0.0	0.8	Yes
Luton (Wandon End)	0.7	1.0	0.0	1.0	0.0	1.0	0.0	0.0	0.1	0.7	0.0	-0.1	No
Kensworth	0.5	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.7	0.0	0.9	No
Hudnall Corner	1.5	1.4	2.0	1.0	1.0	1.0	1.0	1.0	0.1	0.7	-0.1	-0.5	No
Flamstead	0.5	1.0	0.0	0.0	0.0	0.0	-1.0	0.0	0.1	0.7	-0.3	-0.4	No
Markyate	0.6	1.0	0.0	1.0	0.0	1.0	0.0	0.0	0.1	0.6	-0.3	-0.5	No

8.11 L_{Amax} assessment

Residential Receptors

8.11.1 The data in **Appendix 9E** in **Volume 3: Figures and Appendices** shows the number of dwellings within noise contours above L_{Amax} 80 dB for a variety of aircraft. The data shows that the older A320ceo, B737-800, and A321ceo are notably louder than the more recent aircraft; A320neo, A321neo, and B737Max. The ATM figures during the night-time (the period of interest for sleep disturbance within residences) for these two different sets of aircraft age and loudness are presented in **Table 8.25**, with a comparison between the Proposed Scheme and existing operation in **Table 8.26**. The figures in the tables have been extracted from spreadsheets and have been subjected to rounding. The figures are therefore within one digit of the correct number. They have not been updated in the tables so as to remain consistent with the source information.

Table 8.25 Night-time ATMs for most common aircraft types

Aircraft	2024 18 mppa	2028 18 mppa	2024 19 mppa	2028 19 mppa
A320ceo	1,681	644	1,292	438
A321ceo	229	11	303	0
B737-800	487	301	132	49
Total 'old' aircraft	2,396	957	1,727	487
A320neo	1,194	2,061	829	2,040
A321neo	339	605	926	1,210
B737-Max	330	771	675	758
Total 'new' aircraft	1,863	3,436	2,430	4,008
Total of the above aircraft	4,259	4,394	4,157	4,495

Table 8.26 Comparison of ATMs during the night-time

Aircraft sets	2024 19 mppa minus 2024 18 mppa	2028 19 mppa minus 2028 18 mppa
Old aircraft: A320ceo, A321ceo, B737-800	-669	-470
New aircraft: A320neo, A321neo, B737-Max	+556	571
Total of the above	-103	101

8.11.2 The results show that the proportion of the loudest aircraft is predicted to decrease in comparison with the new quieter aircraft. It should also be noted that in 2024 the total ATMs (i.e. also including other aircraft not included in the above table, see forecasts in **Appendix 3A** in **Volume 3: Figures and Appendices**) would decrease and in 2028 the total increase is very small, equating to an average of two additional flights during the night-time in the 92-day summer period. The absolute L_{Amax} level will reduce for a significant number of ATMs.

Non-residential noise sensitive receptors

- 8.11.3 **Appendix 9E in Volume 3: Figures and Appendices** presents the predicted L_{Amax} levels at non-residential receptors for the most common and loudest aircraft. The results show that the 80 dB level is only exceeded during the daytime at two locations; Park Town (Luton), and Slip End. In both cases, the exceedance is a result of the A321ceo departing and there is not this same exceedance for the A321neo. In 2024, there is an increase in daytime A321ceo ATMs for the 19 mppa scenario (see forecasts in **Appendix 3A in Volume 3: Figures and Appendices**), but by 2028, the A321ceo is in reduced use in the 19 mppa scenarios. Therefore, despite a general increase in flights these occurrences of L_{Amax} events over 80 dB(A) would decrease in the long-term. **The effects on non-residential receptors are considered negligible.**

8.12 Assessment Summary

- 8.12.1 A summary of the results of the assessment of the noise is provided in **Table 8.27**.

Table 8.27 Summary of significance of adverse effects

Receptor and summary of predicted effects	Significance	Summary rationale
Residences	Significant Adverse	With the Proposed Scheme, residents in 1,877 dwellings would experience a night-time noise level above SOAEL (55 dB LAeq, 8 hour) 1 - 1.9 dB higher than existing Condition 10 limits allow.
Non-residential receptors at Caddington, Park Town in Luton, Breachwood Green, St Pauls Walden, Slip End and Stevenage.	Significant Adverse	Increases in noise level of at least 1 dB <u>and</u> above threshold of effect criteria.

8.13 Assessment of cumulative effects

- 8.13.1 As outlined in **Section 4.8**, consideration has been given to whether any of the noise receptors that have been taken forward for assessment in this chapter are likely to be subject to cumulative noise effects due to noise effects generated by 'other developments'. However, no 'other developments' have been identified within the study area of this assessment that would contribute to a cumulative noise impact. **No likely significant inter-project effects** are predicted to occur from the Proposed Scheme together with 'other developments'.
- 8.13.2 The potential for inter-related effects has been identified at receptors that could experience noise and health effects, and these are reported in **Chapter 9: Health**. This is because the Health assessment is by its nature cumulative, as it assesses the effects on a variety of determinants of health, one of which is exposure to noise.
- 8.13.3 The air quality, climate, and transport assessments have identified that no likely significant effects are predicted to occur. **No likely significant intra-project effects** involving cumulative noise interactions with these aspects are therefore predicted to occur from the Proposed Scheme.

8.14 Consideration of optional additional mitigation

- 8.14.1 The assessment of noise effects identified the 18 mppa 2022 scenario as the worst-case year in terms of significance of effect based on additional dwellings affected by noise above SOAEL. The resulting area and number of dwellings related to the LOAEL and SOAEL are presented in **Table 8.28**.

Table 8.28: LOAEL and SOAEL for various noise model scenarios

	Area of SOAEL (sq.km)	No. Dwellings in SOAEL	Area of LOAEL (sq.km)	No. Dwellings in LOAEL
Daytime				
Current Condition 10 contour	6.3	720	54.1	13,981
Forecast 18 mppa 2022	7.1	805	57.6	16,411
Night-time				
Current Condition 10 contour	9.6	1,184	60.9	19,490
Forecast 18 mppa 2022	11.5	1,908	68.5	24,906

Mitigation for properties exposed to noise higher than SOAEL

- 8.14.2 The Independent Commission on Civil Aviation Noise (ICCAN) is working towards forming best practice for noise mitigation, but this information is not yet available. Based on current guidance LLAOL have defined two options for mitigation for properties greater than SOAEL; either insulation.
- 8.14.3 Taking the daytime situation, a total of 805 dwellings are forecast to be exposed to noise levels above 63 dB $L_{Aeq16hr}$ (SOAEL) in the 18 mppa 2022 scenario (day-time worst-case year). Based on the current condition, 720 of these properties would already be exposed to these noise levels. Therefore, 85 new properties would be exposed to an increased level of noise due to the forecasted increase in air traffic in 2022.
- 8.14.4 For the night-time, a total of 1,908 dwellings were predicted to be exposed to noise levels above 55 dB L_{Aeq8hr} (SOAEL) in the 18 mppa 2022 scenario (worst-case year) and therefore eligible for insulation. There are currently 1,184 properties within the SOAEL based on the current Condition 10. Therefore in 2022 an increase of 724 new properties would be exposed to an increased level of noise due to the forecasted increase in air traffic.
- 8.14.5 It is forecast that the maximum increase of 85 properties in the daytime SOAEL will be fully contained in the 2022 night-time SOAEL contour and therefore mitigation has been defined based on dwellings within the 2022 night-time SOAEL.
- 8.14.6 Additional measures will be needed to minimise the significant effects identified in **Table 8.9**; namely the 724 additional dwellings above SOAEL during the night-time as a result of the Proposed Scheme.
- 8.14.7 As 2022 is forecast to be the worst-case year in terms of noise insulation provision, the 2022 noise insulation eligibility contour would be fixed for 6 years. Therefore, the scheme would not change each year, but would always be based on 2022 data, allowing everyone affected by the worst-case year to be eligible for insulation in future years.

8.14.8

In accordance with the Noise Action Plan for the Airport, noise insulation is provided to residential receptors exposed to noise above SOAEL as required by the first aim of the NPSE. As part of the proposals, LLAOL will increase contributions to the Noise Insulation Fund as shown in **Table 8.29** which compares this increase with existing funding. LLAOL would continue spending up to approximately £3,000 per property to enhance noise insulation. For reference, **Table 8.29** also shows the funding in 2016 to 2020.

Table 8.29: Increased noise insulation funding

Year	Existing funding		Proposed in this version of Section 73 application	
	Proposed funding	Number of properties	Proposed funding	Number of properties
2016	£100,000	33	£100,000	33
2017	£100,000	33	£100,000	33
2018	£100,000	33	£100,000	33
2019	£100,000	33	£100,000	33
2020	£100,000	33	£100,000	33
2021	£100,000	33	£400,000	133
2022	£100,000	33	£900,000	300
2023	£100,000	33	£700,000	233
2024	£100,000	33	£100,000	33
2025	£100,000	33	£100,000	33
2026	£100,000	33	£100,000	33
2027	£100,000	33	£100,000	33
2028	£100,000	33	£100,000	33
Total	£1,300,000	429	£3,000,000	996

8.14.9

Eligible properties are assessed in accordance with the Noise Insulation Scheme Policy v4 (see **Appendix 8F in Volume 3: Figures and appendices**). The order in which properties are contacted for insulation is determined by the independent London Luton Airport Consultative committee. The scheme would continue to give insulation to those dwellings with the highest noise levels as a priority.

8.14.10

The additional budget of £1,700,000 (further to the £1,300,000 funding existing) would be sufficient to noise insulate properties in areas above SOAEL as a result of proposed variation to Condition 10 assuming no more than 78% (567 properties) take-up (i.e. the pick-up of residents offered noise insulation in the past). The current take-up of insulation is approximately 50%, therefore the contribution is considered sufficient. Based on the current acceptance rate, the enhanced Noise Insulation Fund would cover additional dwellings above SOAEL by the end of 2022.

8.15 Conclusions of significance evaluation

- 8.15.1 It is considered that existing mitigation and enhanced mitigation are sufficient to meet the Government's policy aim to mitigate and minimise adverse impacts on health and quality of life as stated in the NPSE.
- 8.15.2 The significant effect described in **Section 8.8** will be temporary and will not persist past 2027, beyond which the difference between the noise from the variation to the conditions and the existing conditions would not be significant.

8.16 Implementation of environmental measures

- 8.16.1 **Section 8.7** describes the environmental measures within the Proposed Scheme. **Table 8.28** summarises the key compensatory measures and the means by which they will be implemented.

Table 8.30 Summary of environmental measures to be implemented – relating to noise

Environmental measure	Responsibility for implementation	ES section reference
LLAOL will contribute to the Noise Insulation Fund with an initial budget of £400,000 in 2021, £900,000 in 2022, £700,000 in 2023 and £100,000 each year afterwards to 2028 inclusive	LLAOL	Section 8.7

9. Health

9.1 Introduction

- 9.1.1 This chapter of the ES assesses the likely significant effects of the Proposed Scheme with respect to human health effects. The chapter should be read in conjunction with **Chapter 3: Description of the Proposed Scheme** and this chapter should be read in conjunction with **Chapter 8: Noise**, the findings of which have informed the assessment of human health effects. This chapter supplements the health assessments in the 2014 Planning Permission 2012 ES.
- 9.1.2 This health assessment has assessed the likely significant effects arising from the proposed change to raise the passenger throughput cap to 19 mppa, and the resulting changes in air transport movements (ATMs) and surface access movements. The assessment also identifies the likely significant effects arising from the proposed increases to the daytime and night-time noise contours through the variation of Condition 10 for the period to the end of 2027, and from 2028 onwards (see **Section 4.4**).
- 9.1.3 The 2014 Planning Permission 2012 ES described and assessed a range of beneficial and adverse health effects, including associated mitigation and enhancement measures which would continue to apply.
- 9.1.4 The proposed variation to Condition 10 for the period up to the end of 2027, proposes that the area enclosed by the 57 dB(A) L_{eq16hr} (07:00 - 23:00) contour would not exceed 21.6 sq. km for daytime noise, and the area enclosed by the 48 dB(A) L_{eq8hr} (23:00 - 07:00) contour would not exceed 42.9 sq. km for night-time noise. Post 2027, the area enclosed by the 57 dB(A) L_{eq16hr} (07:00 - 23:00) contour would not exceed 15.5 sq. km for daytime noise, and the area enclosed by the 48 dB(A) L_{eq8hr} (23:00-07:00) contour would not exceed 35.5 sq. km for night-time noise (see **Chapter 3: Description of the Proposed Scheme**).
- 9.1.5 The proposed Condition 10 variation is predicted to result in changes in aircraft air noise only. This assessment therefore focuses on the human health effects from changes aircraft air noise only. As set out in **Chapter 6: Air quality** and **Chapter 10: Transport**, the effects of changes in air quality, transport, and noise related to road traffic will not result in significant effects at the sensitive receptors and have been scoped out of the health assessment. This approach to the assessment has been agreed with LBC through the Screening and Scoping stages (see **Sections 4.3** and **4.4**, and **Appendix 1A, 1B, and 1C** in **Volume 3: Figures and Appendices**).
- 9.1.6 Aircraft air noise occurs principally from aircraft arriving and landing, and from aircraft departing and taking-off. It is also produced by aircraft on the ground, and this occurs when aircraft are on the runway for start of take-off roll (SoR), after landing when aircraft are rolling down the runway, and if aircraft are using reverse thrust for braking.
- 9.1.7 The integration of health and its consideration in EIA is a developing area of practice. Interim and brief guidance is provided by the Institute of Environmental Management and Assessment (IEMA)¹⁵⁴. Public Health England has also issued a briefing note on health in EIA for local public health teams¹⁵⁵. The approach set out below draws from the guidance mentioned above as well as

¹⁵⁴ Institute of Environmental Management and Assessment, Faculty of Public Health and Ben Cave Associates (2017) Health in Environmental Impact Assessment: a primer for a proportionate approach. Available at: <https://www.iema.net/resources/reading-room/2017/05/01/get-primed-for-health-in-eia> [Checked November 2020].

¹⁵⁵ Public Health England (2017) Health and Environmental Impact Assessment: a briefing for public health teams in England. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/629207/Health_and_environmental_impact_assessment.pdf [Checked November 2020].

other good practice guidance on HIA from the English Department of Health, Public Health England, the Department for Communities and Local Government, the Devolved Countries in the UK; as well as international agencies and associations such as the International Finance Corporation, and the International Association for Impact Assessment^{156 157 158 159 160 161 162}.

- 9.1.8 This chapter uses the World Health Organization's (WHO) definition of health, which states that health is:

"a state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity".¹⁶³

- 9.1.9 Wellbeing is related to health, with the terms used interchangeably. This chapter also uses a WHO definition for wellbeing, which is related to mental health. The WHO state that mental health is more than the absence of mental disorders and that mental health is a state of wellbeing, defined as:

"a state in which every individual realises his or her own potential, can cope with the normal stresses of life, can work productively and fruitfully and is able to make a contribution to her or his community".¹⁶⁴

- 9.1.10 The focus of this chapter is on community health and wellbeing and not occupational health and safety. The terms 'health', 'human health', and 'health and wellbeing' may be used interchangeably.

9.2 Limitations of this assessment

- 9.2.1 The health assessment has been informed by the findings of **Chapter 8: Noise**, which in turn has been informed by **Chapter 10: Transport**. The findings of the health assessment are therefore constrained by the assumptions and limitations set out in those assessments.
- 9.2.2 In addition, the health assessment is at a population level, and individual level effects are not identified as this would require detailed individual level baseline information which is not feasible.
- 9.2.3 District and ward level data has been used to inform the assessment and is considered representative of the existing residents living, working, and visiting the area around LLA.

¹⁵⁶ Health Development Agency. (2002). Introducing health impact assessment (HIA): informing the decision-making process, England.

¹⁵⁷ NHS Executive. (2000). Resources for HIA: Volumes 1 & 2. London: England.

¹⁵⁸ Welsh Assembly Government and Health Challenge Wales. (2004). Health impact assessment: a practical guide. Available at: https://whiasu.publichealthnetwork.cymru/files/1415/0710/5107/HIA_Tool_Kit_V2_WEB.pdf [Accessed 14 December 2020]

¹⁵⁹ Public Health Institute of Scotland. (2001). HIA: a guide for local authorities; Scottish HIA network; 2001.

¹⁶⁰ Institute of Public Health in Ireland. (2009). Health impact assessment guidance. Available at: http://2019.iph.ie/sites/default/files/documents/files/IPH%20HIA_0.pdf [Accessed 14 December 2020]

¹⁶¹ International Association for Impact Assessment. (2006). Health Impact Assessment International Best Practice Principles. Special Publication Series No. 5. Fargo, USA. Available at: https://www.iaia.org/uploads/pdf/SP5_3.pdf [Accessed 14 December 2020]

¹⁶² International Finance Corporation. (2010). Introduction to Health Impact Assessment. Available at: https://www.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/sustainability-at-ifc/publications/publications_handbook_healthimpactassessment_wci_1319578475704 [Accessed 14 December 2020]

¹⁶³ World Health Organization (2019) Constitution of the World Health Organization. The Constitution was adopted by the International Health Conference held in New York from 19 June to 22 July 1946, signed on 22 July 1946 by the representatives of 61 States and entered into force on 7 April 1948. Later amendments are incorporated into this text. Available at: <https://www.who.int/about/who-we-are/constitution> [Checked November 2020].

¹⁶⁴ World Health Organization (2019) Mental Health: a state of wellbeing. Available at: https://www.who.int/features/factfiles/mental_health/en/ [Checked 17 March 2019].

- 9.2.4 Assuming an average occupancy of 2.7 persons per house, based on census data for the area, this indicates that approximately 17,742 additional residents now live within the study area for the proposed variation to Condition 10.

9.3 Relevant legislation, planning policy, technical guidance

Legislative context

Town and Country Planning (Environmental Impact Assessment) Regulations 2017¹⁶⁵

- 9.3.1 On 16 May 2017, the *2017 EIA Regulations* came into force. This mentions human health explicitly alongside consideration of population aspects. Part 1, General, Clause 4 (2a) states:
- "The EIA must identify, describe and assess in an appropriate manner, in light of each individual case, the direct and indirect significant effects of the proposed development on the following factors (a) population and human health..."*

Environmental Protection Act 1990¹⁶⁶

- 9.3.2 Part III of the *Environmental Protection Act 1990* regulates the control of emissions (including dust, noise, and light) that may be prejudicial to health or a nuisance.

Health and Social Care Act 2012¹⁶⁷

- 9.3.3 The *Health and Social Care Act 2012* (specifically sections 11, 12, 18, 22, 30, 31, and 60) place a duty of care to protect and improve public health on the Secretary of State (SoS) for Health as well as other bodies directed by the SoS for Health. This includes, but is not limited to, local authorities, including Directors for Public Health, and the National Health Service.
- 9.3.4 There is no statutory guidance on considering health in EIA.

Planning policy context

- 9.3.5 There are a number of policies and guidance at the international, national, and local level. Planning policy related to human health is outlined in **Table 9.1**.

Table 9.1 Planning policy issues relevant to human health

Policy reference	Policy issue
International planning policies	
Environmental noise guidelines for the European	For average noise exposure, the Guideline Development Group (GDG) strongly recommends reducing noise levels produced by aircraft below 45 dB Lden ¹⁶⁹ as aircraft noise above this level is associated with adverse health effects.

¹⁶⁵ HM Government (2017) Town and Country Planning (Environmental Impact Assessment) Regulation 2017. Available at: <http://www.legislation.gov.uk/ukxi/2017/571/part/1/made> [Checked November 2020].

¹⁶⁶ HM Government (1990) Environmental Protection Act 1990. Available at: <https://www.legislation.gov.uk/ukpga/1990/43/part/III> [Checked November 2020]

¹⁶⁷ HM Government (2012) Health and Social Care Act 2012. Available at: <http://www.legislation.gov.uk/ukpga/2012/7/contents/enacted> [Checked November 2020]

¹⁶⁹ Day-evening-night level. It is a descriptor of noise level based on energy equivalent noise level.

Policy reference	Policy issue
Region, World Health Organization (2018)¹⁶⁸	For night exposure, the GDG strongly recommends reducing noise levels produced by aircraft during night-time below 40 dB Night as aircraft noise above this level is associated with adverse effects on sleep.
National planning policies	
National Planning Policy Framework (NPPF) (2019)¹⁷⁰	<p>Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should mitigate and reduce to a minimum potential adverse impact resulting from:</p> <ul style="list-style-type: none"> ● noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life; and ● identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.
Environmental noise: valuing impacts on sleep disturbance, annoyance, hypertension, productivity and quiet, 2012¹⁷¹	The report details current understanding of the links between environmental noise and various effects including sleep disturbance, annoyance, hypertension, and related diseases. It also includes some commentary on productivity and the value of quiet areas. The report presents recommended methods to assess these impacts to support policy, programme, and project appraisal.
Public Health Outcomes Framework¹⁷²	This sets out the national vision and targets for public health and how public health is being improved and protected. Key target indicators include: reducing killed and seriously injured casualties on England's roads; reducing percentage of the population affected by noise; increasing utilisation of outdoor space for exercise / health reasons; increasing proportion of physically active adults; reducing the fraction of mortality attributable to particulate air pollution; reducing mortality rate from causes considered preventable; and reducing numbers of 16 - 18 year olds not in education, employment or training.
The Aviation Policy Framework¹⁷³	<p>This sets out the government's policy to all the aviation sector to continue to make a significant contribution to economic growth across the country. The points included here are noted in relation to health:</p> <p>The Government's overall policy on aviation noise is to limit and, where possible, reduce the number of people in the UK significantly affected by aircraft noise. This is consistent with the Government's Noise Policy, as set out in the Noise Policy Statement for England (NPSE) which aims to avoid significant adverse impacts on health and quality of life. The Government wants to strike a fair balance between the negative impacts of noise (on health, amenity (quality of life) and productivity) and the positive economic impacts of flights. The Government expects that the aviation industry will continue to reduce and mitigate noise as airport capacity grows. As noise levels fall with technology improvements the aviation industry should be expected to share the benefits from these improvements with local communities;</p>

¹⁶⁸ World Health Organisation (2018) *Environmental noise guidelines for the European Region*. Available at: <http://www.euro.who.int/en/publications/abstracts/environmental-noise-guidelines-for-the-european-region-2018> [Checked 10 November 2020].

¹⁷⁰ HM Government (2018) *National planning policy framework*. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/810197/NPPF_Feb_2019_revised.pdf [Checked 10 November 2020].

¹⁷¹ Defra (2012) *Environmental Noise: valuing impacts on: sleep disturbance, annoyance, hypertension, productivity and quiet*. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/380852/environmental-noise-valuing-impacts-PB14227.pdf [Checked 10 September 2020].

¹⁷² Public Health England (2020) *Public health outcomes framework*. Available at: <https://fingertips.phe.org.uk/profile/public-health-outcomes-framework> [Checked 10 September 2020].

¹⁷³ HM Government (2013) *Aviation policy framework*. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/153776/aviation-policy-framework.pdf [Checked 10 September 2020].

Policy reference	Policy issue
	<p>The Government will continue to treat the 57 dB L_{Aeq} 16 hour contour as the average level of daytime aircraft noise marking the approximate onset of significant community annoyance. However, this does not mean that all people within this contour will experience significant adverse effects from aircraft noise. Nor does it mean that no-one outside of this contour will consider themselves not annoyed by aircraft noise. The Government recommends that average noise contours should not be the only measure used when airports seek to explain how locations under flight paths are affected by aircraft noise; and</p> <p>The Government recognises that the costs on local communities are higher from aircraft noise during the night, particularly the health costs associated with sleep disturbance. Noise from aircraft at night is therefore widely regarded as the least acceptable aspect of aircraft operations. However, the Government also recognises the importance to the UK economy of certain types of flights, such as express freight services, which may only be viable if they operate at night. In recognising these higher costs upon local communities, the Government expects the aviation industry to make extra efforts to reduce and mitigate noise from night flights through use of best-in-class aircraft, best practice operating procedures, seeking ways to provide respite wherever alternatives are available.</p> <p>Whilst the Government's policy is to give particular weight to the management and mitigation of noise in the immediate vicinity of airports, there may be instances where prioritising noise creates unacceptable costs in terms of local air pollution. For example, displacing the runway landing threshold to give noise benefits could lead to significant additional taxiing and emissions. For this reason, the impacts of any proposals which change noise or emissions levels should be carefully assessed to allow these costs and benefits to be weighed up.</p>
Development plan policies	
Luton Local Plan 2011-2031 (2017) ¹⁷⁴	<p>'1.23 ... The Local Plan will support and promote development that is designed, constructed and managed in ways that improve health and promote healthy lifestyles.</p> <p>3.4 Luton's economic, social and environmental resources and assets will be used efficiently and sustainably to deliver economic prosperity and an improved quality of life, health and wellbeing for all the residents of the Borough...</p> <p>3.5 London Luton Airport will be improved to provide more jobs related to aviation industries and other associated business clusters and maintain London Luton Airport's key role as a sub-regional economic driver bringing wealth and job creation (including high skilled jobs) to the town and neighbouring local authorities.'</p>
Luton Health and Wellbeing Strategy 2019-2024 ¹⁷⁵	'Luton is a more equitable place where people thrive, have the opportunity to live a healthy life mentally, socially and physically; and maximize their potential.'
Luton's joint strategic needs assessment 2020 ¹⁷⁶	<p>Noise Pollution, Priorities</p> <ol style="list-style-type: none"> 1. Map noise complaints across the borough to provide a greater understanding of any noise hotspots affecting local residents, allowing for targeted local action. 2. Monitor measures in place ensure that the impact of noise as a result of airport expansion is mitigated. <p>Air Quality, Priorities</p> <ol style="list-style-type: none"> 1. Review current air quality strategy for Luton and ensure there is a full range of actions to improve air quality.

¹⁷⁴ Luton Borough Council (2017) *Luton local plan 2011- 2031*, November 2017. Available at:

<https://www.luton.gov.uk/Environment/Lists/LutonDocuments/PDF/Local%20Plan/adoption/Luton-Local-Plan-2011-2031-November-2017.pdf> [Checked 10 September 2020].

¹⁷⁵ Luton Borough Council (2016) *Luton's population wellbeing strategy 2019-2024*. Available at

<https://www.luton.gov.uk/Council government and democracy/Lists/LutonDocuments/PDF/CPC/CPC%202020/Population-wellbeing-strategy-2019-2024.pdf> [Checked 10 September 2020].

¹⁷⁶ Luton Borough Council (2015) *Luton's joint strategic needs assessment*. Available at:

<https://m.luton.gov.uk/Page/Show/Community and living/Luton%20observatory%20census%20statistics%20and%20mapping/Pages/Joint%20Strategic%20Needs%20Assessment%20-%20JSNA.aspx> [Checked 10 September 2020].

Policy reference	Policy issue
	<p>2. Develop and expand actions to focus on the reduction of road traffic as the major source of air pollution in the town.</p> <p>3. Ensure all major developments, and any significant developments in areas of elevated air pollution, are required to produce an air quality assessment.</p> <p>Transport, Priorities</p> <p>1. Increase the use of sustainable travel (including walking and cycling) as the 'first choice' of transport.</p> <p>2. Increase accessibility of public transport in areas in the south and east of Luton and key facilities and employment sites.</p> <p>4. Maximise the national and regional accessibility of Luton's key facilities and employment opportunities in order to attract inward investment.</p>

Technical guidance

- 9.3.6 Planning Practice Guidance on EIA outlines the requirements of the *2017 EIA Regulations*. However, the guidance does not provide additional information in relation to defining, scoping, or assessing human health. Regard has therefore been given to the *2017 IEMA publication*¹⁵⁴.
- 9.3.7 Planning Practice Guidance on health and wellbeing that applies more broadly than EIA notes the following:
- *The link between planning and health has been long established. The built and natural environments are major determinants on health and wellbeing;*
 - *The range of issues that could be considered through the plan-making and decision-making processes, in respect of health and healthcare infrastructure, include how:*
 - ▶ *Development proposals can support strong, vibrant and healthy communities and help create healthy living environments which should, where possible, include making physical activity easy to do and create places and spaces to meet to support community engagement and social capital;*
 - ▶ *The healthcare infrastructure implications of any relevant proposed local development have been considered;*
 - ▶ *Opportunities for healthy lifestyles have been considered (e.g. planning for an environment that supports people of all ages in making healthy choices, helps to promote active travel and physical activity, and promotes access to healthier food, high quality open spaces, green infrastructure and opportunities for play, sport and recreation);*
 - ▶ *Potential pollution and other environmental hazards, which might lead to an adverse impact on human health, are accounted for in the consideration of new development proposals; and*
 - ▶ *Access to the whole community by all sections of the community, whether able-bodied or disabled, has been promoted.*
- 9.3.8 The *Air Navigation Guidance (ANG) 2017*¹⁷⁷ provides guidance on setting the Lowest Observed Adverse Effect Level (LOAEL) as 51 dB L_{Aeq,16hr} and 45 dB L_{Aeq,8hr}. ANG 2017 states that the government advises setting a LOAEL which is the point at which adverse effects begin to be seen on a community-wide basis. As noise exposure increases above this level, so will the likelihood of experiencing an adverse effect. In line with this increase in risk, the proportion of the population likely to be significantly affected can be expected to grow as the noise level increases over the

¹⁷⁷ Department for Transport and Civil Aviation Authority (2017) *Air Navigation Guidance 2017*, [online]. Available at <https://www.gov.uk/government/publications/uk-air-navigation-guidance-2017> [Checked November 2020]

LOAEL. For the purposes of assessing and comparing the noise impacts of airspace changes, the government has set a LOAEL of 51 dB $L_{Aeq16hr}$ for daytime noise and 45 dB L_{Aeq8hr} for night-time noise and the Civil Aviation Authority (CAA) are tasked with ensuring that these metrics are considered.

9.3.9 **Chapter 8: Noise** provides details of the relevant noise technical guidance.

9.4 Data gathering methodology

Study area

9.4.1 The study area for the desktop data gathering encompasses the LBC local authority area, key wards around LLA and, where appropriate, Lower Layer Super Output Areas¹⁷⁸.

Desk study

9.4.2 Evidence suggests that different groups within communities have varying susceptibilities to health impacts and benefits. This is because of social and demographic structure, behaviours, and relative economic circumstances. A baseline assessment provides information to better consider how potential health effects may act disproportionately upon certain communities and sensitive groups.

9.4.3 Health and relevant determinants of health baseline data has been collected and reviewed from:

- Public Health England community health profiles and local area health data;
- Luton Borough Council joint strategic needs assessment data and information; and
- Ministry of Housing, Communities & Local Government; indices of multiple deprivation 2019.

9.5 Overall baseline

9.5.1 LLA is situated at the southern end of the LBC local authority area. It is surrounded by North Hertfordshire, Stevenage, Central Bedfordshire, St. Albans, and Dacorum districts. The health of the population of LBC is significantly worse compared to the England average, with higher levels of death, illness and deprivation and higher levels of health status and life expectancy. The health of the five districts neighbouring LBC is significantly better than LBC and the England average. LLA is situated in Wigmore ward and surrounded by Crawley and Round Green wards, in Luton borough; Hitchwood, Offa and Hoo, and Kimpton wards, in North Hertfordshire district; and Caddington in Central Bedfordshire borough. The wards have a similar health profile to their respective boroughs or districts (in most cases they are better than or in line with the overall health status). The focus of this health profile is therefore on the population of LBC as representative of the residents who are most vulnerable to the health and wellbeing effects of the Proposed Scheme.

9.5.2 The health of people in LBC is generally worse than the England average. Luton is one of the 20% most deprived local authorities in England, and approximately 19% (9,650) of children in LBC live in low-income families¹⁷⁹. Life expectancy for both men and women is significantly worse in LBC than the England average.

¹⁷⁸ Super Output Areas were designed to improve the reporting of small area statistics and are built up from groups of Output Areas. Lower Layer Super Output Areas are generally the smallest scale that routine statistics go down to. they are geographical areas that have between 1,000-3,000 people and between 400-1,200 households. There are currently (as of 2011) 32,844 LSOAs in England.

¹⁷⁹ Public Health England (2019). Luton local authority health profile 2019. Available at: <https://fingertips.phe.org.uk/profile/health-profiles> [Checked 14 September 2020].

- 9.5.3 The most recent available data on strategic noise mapping shows that the impact of noise in LBC is lower than the national average and most neighbouring boroughs. These maps use national calculation methods and use data supplied by local authorities to model the percentage of the population exposed to road, rail, and air transport noise of 55 dB and 65 dB between 07:00 - 23:00. This data shows that the percentage of residents in LBC affected by noise above 65 dB is lower than in Slough, Birmingham, Wolverhampton, Hillingdon, and Redbridge. It also shows the percentage of residents in LBC affected by noise above 55 dB is also lower than those other areas, with the exception of Wolverhampton¹⁸⁰.
- 9.5.4 The most recent available data on the rate of complaints from LBC residents is below the England average. Compared to LBC, Slough and Birmingham have a lower rate of complaints, while in Wolverhampton, Hillingdon, and Redbridge the rates are higher.

Current baseline

- 9.5.5 In this community profile, the words 'significantly' and 'not significant' are used in the epidemiological sense of being a difference that is not due to chance (i.e. that this is a real difference). Where there is no statistical significance this means that the indicator is likely to be the same as the England average (i.e. no difference).
- 9.5.6 All the statistics referenced below are from the Public Health England long local health profile, unless otherwise referenced.¹⁸¹
- 9.5.7 In 2017, LBC had a population of 214,700. The population of LBC has been growing steadily over the last decade by 1 - 1.5%, though it decreased by 0.6% between 2016 and 2017¹⁸². Almost 29% of the population is under 19 years old, higher than the England average, with just over 12% of the population being over 65 years old, lower than the England average (in 2017). Approximately 40% of the population is from a minority ethnic group (and approximately 55% from a non-white UK background, 2016 figures)¹⁸³.
- 9.5.8 As previously mentioned, LBC is in the 20% most deprived areas in England with an Indices of Multiple Deprivation score of 27.6 compared to the England average of 21.8¹⁸⁴. Income deprivation, child poverty, and older people in deprivation in LBC is significantly worse than the England average (17.8%, 23.7% and 21.3% compared to 14.6%, 19.9% and 16.2%, respectively). LBC has a significantly higher proportion of low birth weight babies, lower level of child development at age 5, and a lower level of GCSE achievement compared to the England average (as of 2020, latest Public Health England information).
- 9.5.9 **Figure 9.1** shows the overall deprivation in LBC and the surrounding area in relation to LLA (highlighted by a teardrop marker)¹⁸⁵. The figure shows that deprivation in and around LLA is low.

¹⁸⁰ Luton Borough Council (2020) Luton's joint strategic needs assessment: noise pollution. Available at: https://www.luton.gov.uk/Community_and_living/Luton%20observatory%20census%20statistics%20and%20mapping/Pages/Joint%20Strategic%20Needs%20Assessment%20-%20JSNA.aspx [Checked 14 September 2020].

¹⁸¹ Public Health England (2020) Luton local health profile. Available at: https://www.localhealth.org.uk/#c=report&chapter=c01&report=r01&selgeo1=ward_2018.E05009158&selgeo2=eng.E92000001 (Checked 14 September 2020).

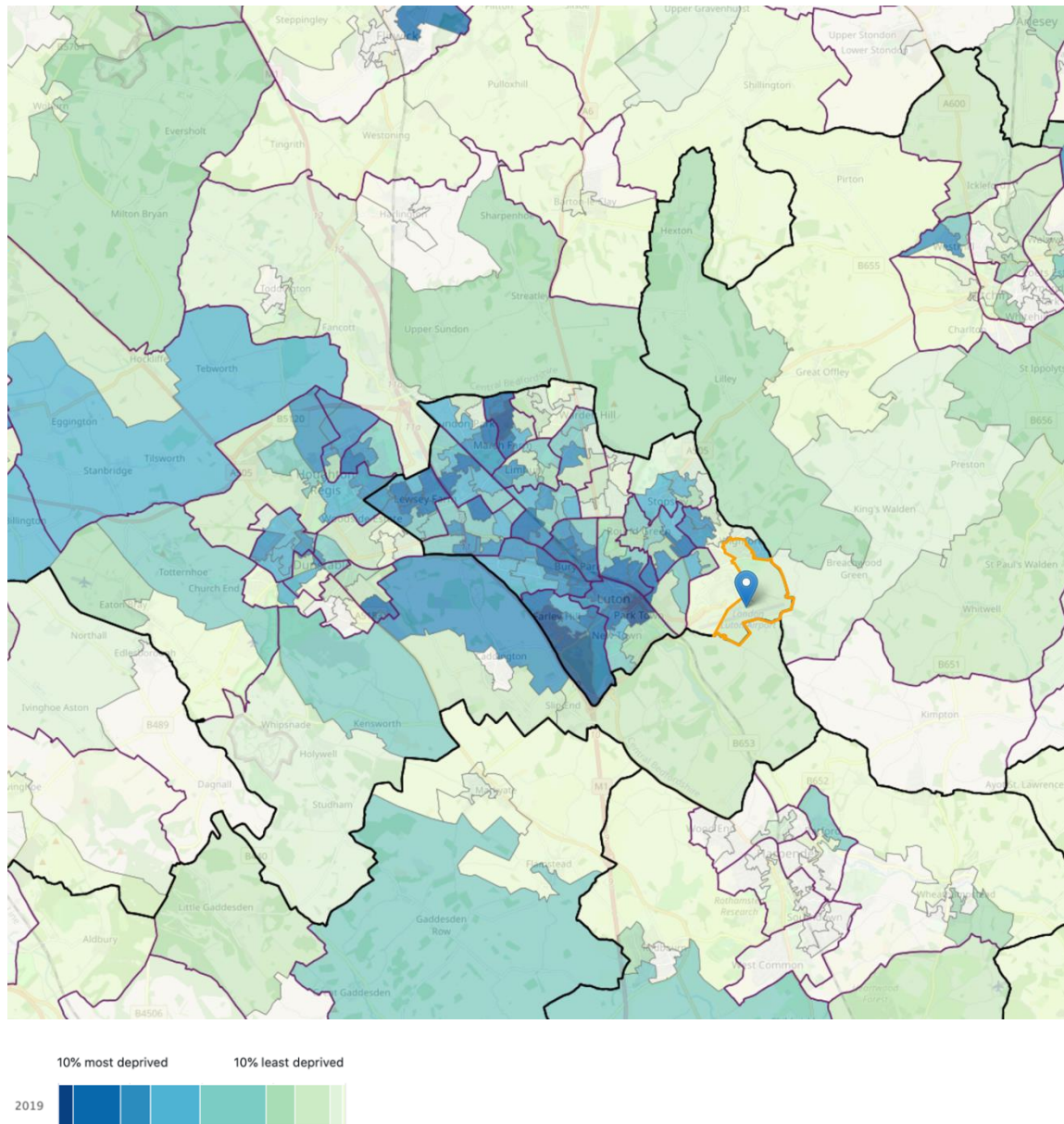
¹⁸² Luton Borough Council (2018) Luton 2017 mid-year population estimates. Available at: <https://www.luton.gov.uk/Environment/Lists/LutonDocuments/PDF/Planning/Observatory/Mid-year-population-estimate.pdf> [Checked November 2020].

¹⁸³ Public Health England (2019). Luton local authority health profile 2019. Available at: <https://fingertips.phe.org.uk/profile/health-profiles> [Checked 14 September 2020].

¹⁸⁴ Public Health England (2020) Luton local health profile. Available at: https://www.localhealth.org.uk/#c=report&chapter=c01&report=r01&selgeo1=ward_2018.E05009158&selgeo2=eng.E92000001 [Checked 14 September 2020].

¹⁸⁵ Ministry of Housing, Communities, & Local Government (2020) Indices of deprivation 2019 and 2015 explorer. Available at: http://dclgapps.communities.gov.uk/imd/iod_index.html [Checked 14 September 2020].

Figure 9.1 Map of overall deprivation in LBC and surrounding areas

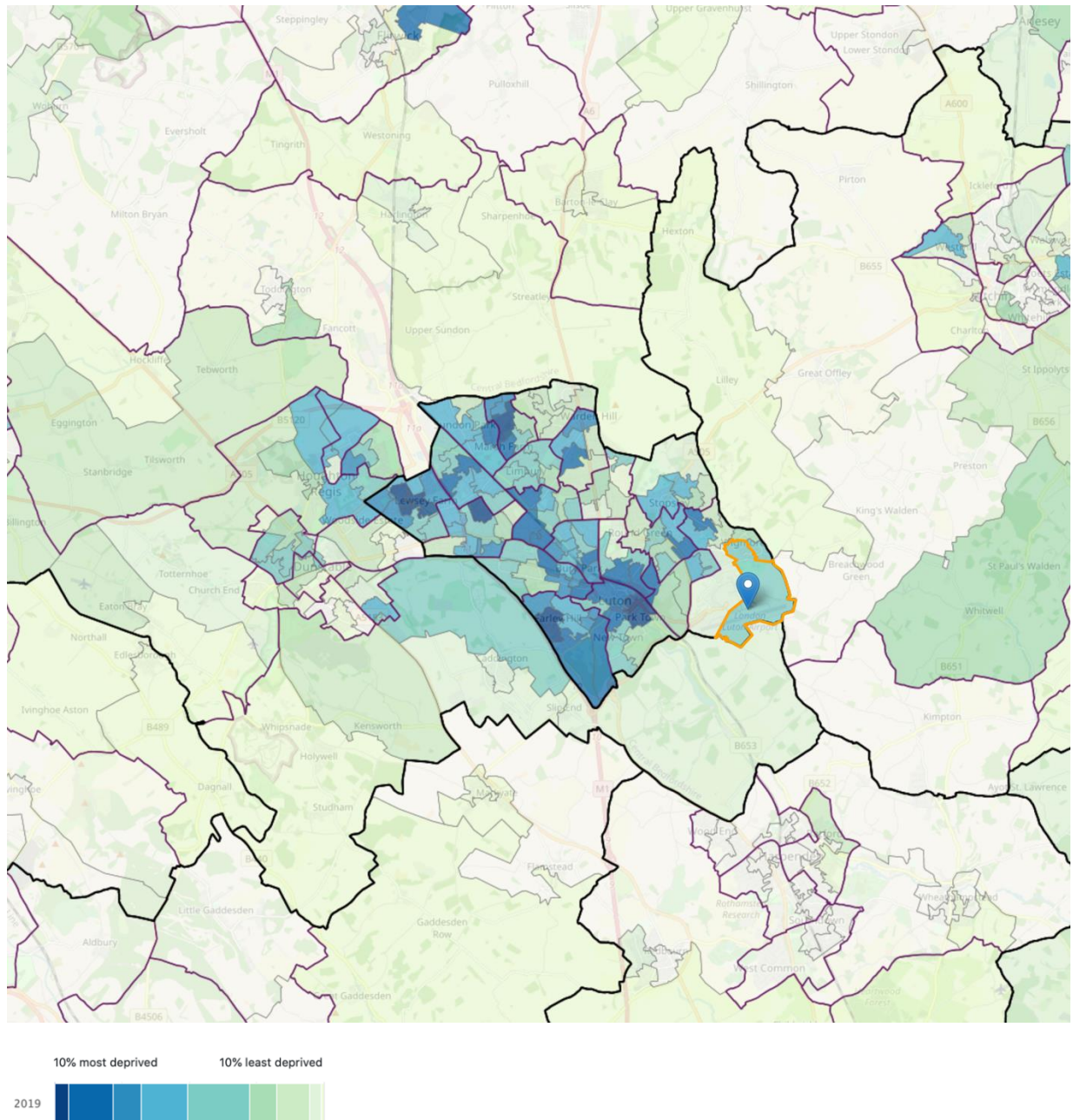


Source: English indices of deprivation 2019: mapping resources¹⁸⁶

Figure 9.2 shows health in LBC and the surrounding area in relation to LLA (highlighted by a teardrop marker). The figure shows that health deprivation immediately around LLA is moderate (top 30% of most deprived Lower Layer Super Output Areas (LSOAs)).

¹⁸⁶ Ministry of Housing, Communities & Local Government (2019). Mapping resources, interactive tools and Open Data facilities to aid user's exploration of the English indices of deprivation 2019. Available [online] at: <https://www.gov.uk/guidance/english-indices-of-deprivation-2019-mapping-resources> [Accessed November 2020].

Figure 9.2 Map of health deprivation in LBC and surrounding areas



Source: English indices of deprivation 2019: mapping resources¹⁸⁶

- | | |
|--------|---|
| 9.5.10 | Limiting long term disability is significantly better than the England average (15.6% compared to 17.6%, 2011). |
| 9.5.11 | Obesity in Reception Year and Year 6 children is significantly worse than the England average (as is excess weight in Year 6 children, 2015-18). Obesity in adults was significantly worse in previous years but is now in line with the England average (2017-18). |
| 9.5.12 | Emergency hospital admissions for all causes is significantly worse (standardised admissions ratio of 127.3 with England at 100; this suggests that for every 100 admissions in England, LBC has around 127 admissions, 2013-18). Emergency hospital admissions for coronary heart disease, heart attacks, and chronic obstructive pulmonary disease are also significantly worse (140.2, 151.5 and 136.5 admissions for every 100 admissions in England, 2013-18). |

- 9.5.13 Lung cancer incidence is significantly worse compared to the England average (107 cases for every 100 cases in England, 2012-16). Breast cancer incidence is significantly lower and colorectal and prostate cancer incidence is in line with the England average (2012-16).
- 9.5.14 Early deaths in under 75 year olds, from all causes, cancers, and circulatory disease, are significantly worse than the England average (2011-15).
- 9.5.15 Hospital stays for alcohol-related harm (an indicator of mental health and wellbeing) is significantly worse (higher) than the England average (110.9 stays in LBA for every 100 stays in England, 2013-2018).
- 9.5.16 Life expectancy is 10.4 years lower for men and 6.3 years lower for women in the most deprived areas of LBC compared to the least deprived areas (2014-16).¹⁸⁷ Life expectancy, healthy life expectancy, and disability-free life expectancy are all significantly worse than the England average (2013-17).
- 9.5.17 LBC has higher estimated prevalence for depression, mixed anxiety and depression, phobias, panic disorders, and obsessive-compulsive disorder (these are hereafter termed 'common mental health disorders') compared to England and comparator areas¹⁸⁸. The current prevalence of common mental health disorders (CMD) is between 21,000 and 22,000 and is estimated to increase by a further 2,000 in the next ten years. Women are more likely to be diagnosed with a CMD than men (19.7% compared to 12.5%).
- 9.5.18 In children aged 5 to 16 years old the estimated prevalence of: overall mental health disorders is 11.5%, emotional disorders is 3.7%; conduct disorders is 6.1%; and hyperkinetic disorders is 1.7% (which are in line with the England average for 2015)¹⁸⁹. The proportion of children with social, emotional, and mental health needs in primary and secondary schools is 2.16% and 2.63% (the former is in-line and the latter is significantly worse than the England average for 2018).

Future baseline

- 9.5.19 Trends in population health and wellbeing in LBC (and the other five surrounding districts) are likely to improve slowly over time, with mortality from all causes likely to continue on the slight downward trend that it is currently on. Levels of inequality are also likely to remain the same with those from lower socio-economic backgrounds having a higher mortality than those from higher socio-economic backgrounds. LBC has a much higher level of inequalities in men for under 75 mortality from all causes, compared to the five surrounding districts.
- 9.5.20 LBC is therefore likely to continue to have lower levels of life expectancy in both men and women, and higher levels of mortality from cardiovascular disease, lung cancer and respiratory diseases compared to the five surrounding districts.
- 9.5.21 Health trends in the surrounding boroughs and districts are also likely to continue to be better than for LBC.

¹⁸⁷ Public Health England (2019). Luton local authority health profile 2019. Available at: <https://fingertips.phe.org.uk/profile/health-profiles> [Checked 14 September 2020].

¹⁸⁸ Luton Borough Council (2018) Luton mental health needs assessment. Available at: https://www.luton.gov.uk/Community_and_living/Lists/LutonDocuments/PDF/JSNA/9.2%20Adult%20mental%20health%20and%20wellbeing.pdf [Checked 14 September 2020].

¹⁸⁹ Public Health England (2020) Children and young people's mental health and wellbeing profile: East of England. Available at: <https://fingertips.phe.org.uk/profile-group/mental-health/profile/cypmh/data#page/0/gid/1938133090/pat/6/par/E12000006/ati/102/are/E06000032> (Checked November 2020).

Consultation

9.5.22 **Table 9.2** provides a summary of the issues about the Proposed Scheme that have been raised by consultees to date and the responses given.

Table 9.2 Summary of issues raised during consultation regarding health

Issue raised	Consultee(s)	Response and how considered in this chapter	Section ref
The increase in noise exposure is likely to lead to some additional cases of hypertension, stroke, ischaemic heart disease, and dementia. Furthermore, the increased noise exposure is also likely to lead to additional annoyance and sleep disturbance within the exposed population.	Luton Borough Council	This has been taken into account in the assessment of potential health impacts on affected residents.	Section 9.9
Consider the health implications of noise on residents when windows are open in their homes and when they are outdoors.	Luton Borough Council	This has been taken into account in the assessment of potential health impacts on affected residents.	Section 9.9
Consider the health implications of the temporary four year period of noise increases as this is a length of time that may give rise to health effects.	Luton Borough Council	This has been taken into account in the assessment of potential health impacts on affected residents.	Section 9.9
Some comments received from respondents expressed concerns about the impact of the proposals on health, mental health, sleep, quality of life and wellbeing from increases in passengers, noise, and air quality.	Various	This has been taken into account in the assessment of potential health impacts on affected residents.	Section 9.9

9.6 Scope of the assessment

Spatial scope

9.6.1 The geographic scope of the health assessment encapsulates LLA and all areas within the furthest extending noise contour. This includes the following population groups:

- the population immediately adjacent to LLA; and
- the affected population of Luton, North Hertfordshire, St. Albans, and Dacorum.

Temporal scope

9.6.2 The key assessment year is the future year of 2028, which corresponds to the future year identified within the 2012 ES for the 2014 Planning Permission. However, there are years prior to this that also need assessment for three reasons:

1. The variation to Condition 10 presents a new area limit for the daytime 57 dB LAeq, 16 hr and night-time 48 dB LAeq, 8 hr assessment, which is based on the widest area, predicted to be in 2021 with 18 mppa.

2. As modernization reduces the noise effect from the airport operations, the 2028 year would not be the worst-case scenario. To ensure that environmental measures required to minimise significant noise effects encompass the worst-case effect from the Proposed Scheme, interim years between 2021 and 2028 also need to be assessed. The worst-case year has been identified as 2022. Additional years of 2023 and 2024 have been included in the noise assessment (see **Chapter 8: Noise**) as information to show how noise decreases, supporting the conclusion that 2022 is the worst-case year for significant effect.
3. 2024 has also been assessed in the noise assessment (see **Chapter 8: Noise**) because this is the first year where 19 mppa is predicted to be reached, the findings of which support the conclusion that 2022 is the worst-case year for significant effect.

9.6.3 To undertake the assessment of the key year of 2028, the predicted noise contours for the Proposed Scheme are compared to the baseline condition. As the proposal is to vary a condition of the 2014 Planning Permission, it is considered relevant to use the baseline of 12.5 mppa in 2028, as was assumed for the 2012 ES (as updated with runway operation and population numbers). By undertaking this comparison, it is possible to analyse the effect as would have been identified in 2012 with this different condition (given necessary adjustments for the latest knowledge). For years prior to 2028 which encompass both the change to the Condition 10 and the worst-case year, it is more appropriate to compare with what it is permissible currently, i.e. what is the actual effect that could be experienced at residences, assuming what is permissible with the existing Condition 10 contour area.

9.6.4 In summary, three non-variation scenarios are considered as a baseline for comparison:

- the extent of the existing Condition 10 for 2021 to 2027 inclusive, which provides a noise limit for airport 'in-air' operation;
- the extent of the existing Condition 10 for 2028 onwards, which provides a future noise limit for airport in-air operation; and
- the 'without Proposed Scheme' 2028 scenario of 12.5 mppa as assessed in the 2014 Planning Permission 2012 ES but updated to take into account the latest knowledge of fleet mix and runway split.

9.6.5 The temporal scope of the assessment covers the following scenarios:

- comparison of 2021 18 mppa scenario, with the existing Condition 10 limits for 2021-2027 showing the short-term change in noise levels prior to 19 mppa taking effect;
- comparison of 2022 18 mppa scenario, with the existing Condition 10 limits for 2021-2027 showing the short-term change in noise levels prior to 19 mppa taking effect;
- comparison of the 2028 19 mppa scenario, with the future baseline ('do nothing') scenario of 2028 (12.5 mppa) for long-term effects as would have been expected from the 2014 Planning Permission as assessed in the 2012 ES; and
- comparison of the 2028 19 mppa scenario, with the Condition 10 limits for 2028 onwards for long-term effects.

Potential receptors

9.6.6 Potential receptors are those locations used by people at which there is an environmental or social change that could affect a health outcome. For the proposed variation to Condition 10, this focuses on health effects associated with aircraft noise.

- 9.6.7 The scope of the assessment focuses on potential receptors, including community effects to residents, facilities such as school and hospitals, and other community facilities relevant to wellbeing such as, recreational areas and places of worship. For clarity, the key general population groups considered are:
- residents (residents living within the furthest extending noise contour) both indoors and outdoors as users of private and public green and open spaces;
 - those in employment who work around the LLA; and
 - any visitors/tourists of recreational amenities around LLA.
- 9.6.8 LLA employees are scoped out of further assessment as the change in noise contours would not directly affect them. In the instance where they reside in the area of the variation in noise contours, they are included as residents.
- 9.6.9 The key population sub-groups/sensitive receptors that have been defined in relation to their potential sensitivity to changes associated with LLA are as follows:
- older people, defined as those aged 65+ years;
 - young people, defined as those below the age of 16-18 years;
 - children, including students attending school within the proposed noise contour areas;
 - people under care in hospitals and other health and social care facilities;
 - those with disabilities; and
 - deprived (disadvantaged) communities¹⁹⁰.

Approach to identifying potential significant effects

- 9.6.10 The proposed variation to Condition 10 has potential to lead to some significant health effects. The likely effects of the proposed variation to Condition 10 that have the potential to be significant with regards to health, have undergone further assessment. These effects are summarised in the following sections.
- 9.6.11 It should be noted that when beneficial effects are identified as part of an assessment, for example reductions in aircraft noise, they do not necessarily cancel out any adverse effects that have been identified. This is because beneficial effects and adverse effects can be experienced by different groups within a community. However, they can overlap where people experience both beneficial and adverse effects at the same or at different points in time (e.g. the beneficial effect associated with provision of a new community facility or open space and the negative effect associated with additional vehicles on local roads).

Determinants of health

- 9.6.12 Population health can be influenced by a wide variety of direct and indirect factors, from modifiable factors such as lifestyle to uncontrollable factors such as genetics. The influences and effects can be wide-ranging and are likely to vary between individuals. In determining 'physical, mental, and social wellbeing', contributory factors, known as 'determinants', are considered. Determinants are a reflection of a mix of influences from an individual's society and environment.
- 9.6.13 Given the scope of the proposed variations, any interactions with human health will be limited to those associated with aircraft noise. All determinants of health unrelated to aircraft air noise have

¹⁹⁰ Those facing existing environment, health and social burdens and those on low incomes.

been scoped out of further assessment. This is because the proposed variations would lead to no change to the spatial pattern of ATMS and have been shown to not cause significant adverse impacts on air quality (see **Chapter 6: Air quality**) or on the road network (see **Chapter 10: Transport**). Therefore, the proposed variation to Condition 8 has been scoped out of the assessment, as agreed with LBC (see **Appendix 1C in Volume 3: Figures and Appendices**), and the variation to Condition 10 is not expected to alter any of the air quality or transport related determinants of health in ways that could adversely affect community health and wellbeing.

- 9.6.14 Health effects of physical severance have been scoped out. This is because **Chapter: 10 Transport** estimates an increase in traffic during the AM and PM peaks that is less than 4% of current traffic volumes. It also projects that the use of public transport will continue to increase, and this has the potential to lower traffic flows over time, particularly with the introduction of the Direct Air-Rail Transit (DART).

Aircraft noise: determinants of health

- 9.6.15 There are direct health effects of noise exposure on physical and mental health and wellbeing, as well as some level of indirect health effects through the effect of noise on learning and education, social capital and community cohesion, and leisure and recreation. For learning and education, this links to the potential adverse cognitive effects on children¹⁹¹. For social capital and community cohesion, this relates to the potential for noise to reduce outdoor social interaction (e.g. helping behaviour)¹⁹². For leisure and recreation, this links to potential reduced satisfaction and increased annoyance in using green and open spaces and the value of such spaces as sanctuaries from noise^{193,194}.

Aircraft noise: potential health outcomes / effects

- 9.6.16 Non-communicable diseases can be associated with changes in the noise environment. Changes in the noise environment may lead to an increase in awakenings and / or stress that manifests as sleep disturbance, high blood pressure (hypertension), and an increase in weight (overweight and obesity). Sleep disturbance may lead to an increase in heart rate and rising blood pressure while sleeping. While awake, increased noise in the daytime may also lead to a rise in blood pressure.
- 9.6.17 Mental health and wellbeing can also be associated with changes in the noise environment. Changes in noise levels can lead to sleep disturbance, annoyance, and some cognitive effects in children. For example, evidence has indicated that certain levels of aircraft noise can have small adverse cognitive effects on children, including lower reading comprehension and language acquisition. Noise can affect mental health and wellbeing via annoyance during the day and reducing the proportion of good quality sleep obtained at night.
- 9.6.18 While these effects are small on an individual basis, they have an in-combination and aggregate effect across an affected population.
- 9.6.19 The WHO issued new Environmental Noise Guidelines for the European Region in 2018. As part of the guidelines' development process, eight systematic reviews of evidence were conducted to assess the relationship between environmental noise and various health outcomes. The quality of the evidence presented in the systematic reviews was assessed by the WHO Systematic Review

¹⁹¹ Stansfeld, S.A. (2003) Noise pollution: non-auditory effects on health, British Medical Bulletin, 68(1), pp. 243-257.

¹⁹² Mathews, K.E. and Canon, L.K. (1975) Environmental noise as a determinant of helping behaviour, Journal of personality and Social Psychology, 32(4), pp. 571-577.

Page, R.A. (1977) Noise and helping behaviour, Environment and Behavior, 9(3), pp. 311-334.

¹⁹³ Brookfield, K. (2017) Residents' preferences for walkable neighbourhoods. Journal of Urban Design, 22(1), pp. 44-58.

¹⁹⁴ Gidlof-Gunnarsson, A. and Ohrstrom (2007) Noise and well-being in urban residential environments: the potential role of perceived availability to nearby green areas. Landscape and Urban Planning, 83(2-3), pp. 115-126.

Team (SRT). An overview of key findings from the reviews of evidence on the association between aircraft air noise and health outcomes is provided in the paragraphs below.

- 9.6.20 There is evidence on the relationship between exposure to aircraft noise, measured as L_{den} , and annoyance. The lowest category of noise exposure considered in any the systematic review that informed the WHO guidelines is 40 dB L_{den} , corresponding to approximately 1.2% High Annoyance (HA). The benchmark level of 10% HA is reached at approximately 45 dB L_{den} . The quality of this evidence was judged by the WHO SRT to be of moderate quality.
- 9.6.21 There is evidence on the relationship between exposure to aircraft noise, measured as L_{den} , and incidence of hospital admissions^{195 196} and prevalence of, and mortality due to ischaemic heart disease¹⁹⁷. The quality of this evidence was judged by the WHO SRT to be of low and very low quality. The weighted average of the lowest noise levels measured in these studies was 47 dB L_{den} and a relevant risk increase from exposure to aircraft noise was found to occur at 52.6 dB L_{den} .
- 9.6.22 There is evidence on the relationship between exposure to aircraft noise, measured as L_{den} , and the incidence^{198 199} and prevalence^{200 201 202} of hypertension. The quality of this evidence was judged by the WHO SRT to be of moderate and low quality, respectively.
- 9.6.23 There is evidence on the relationship between exposure to aircraft noise, measured as L_{den} , and the incidence of hospital admissions^{203 204} and mortality due to stroke²⁰⁵. The quality of this evidence was judged by the WHO SRT to be of very low quality for incidence and prevalence and of moderate quality for mortality.
- 9.6.24 There is evidence on the relationship between exposure to aircraft noise, measured as L_{den} , and cognitive impairment. Evidence rated moderate quality was available for impaired reading and oral

¹⁹⁵ Correia AW, Peters JL, Levy JI, Melly S, Dominici F (2013). Residential exposure to aircraft noise and hospital admissions for cardiovascular diseases: multi-airport retrospective study. *BMJ*. 347:f5561.

¹⁹⁶ Hansell AL, Blangiardo M, Fortunato L, Floud S, Hoogh K de, Fecht D et al. (2013). Aircraft noise and cardiovascular disease near Heathrow airport in London: small area study. *BMJ*. 347:f5432.

¹⁹⁷ Huss A, Spoerri A, Egger M, Roeoesli M, for the Swiss National Cohort Study Group (2010). Aircraft noise, air pollution, and mortality from myocardial infarction. *Epidemiology*. 21(6):829–36.

¹⁹⁸ Bluhm G, Eriksson C, Hilding A, Ostenson CG (2004). Aircraft noise exposure and cardiovascular risk on men. First results from a study around Stockholm Arlanda airport. In: Proceedings. 33rd International Congress and Exhibition on Noise Control Engineering, Prague, Czechia, 22–25 August 2004. Prague: Czech Acoustical Society.

¹⁹⁹ Bluhm G, Eriksson C, Pershagen G, Hilding A, Östenson CG (2009). Aircraft noise and incidence of hypertension: a study around Stockholm Arlanda airport. In: Proceedings. 8th European Conference on Noise Control 2009 (EURONOISE 2009).

²⁰⁰ Babisch W, Houthuijs D, Kwakkeboom J, Swart W, Pershagen G, Bluhm G et al. (2005b). HYENA - hypertension and exposure to noise near airports: a European study on health effects of aircraft noise. In: Proceedings. 34th International Congress on Noise Control Engineering 2005 (INTER-NOISE 2005), Rio de Janeiro, Brazil, 7–10 August 2005. Washington DC: Institute of Noise Control Engineering of the USA.

²⁰¹ Floud S, Vigna-Taglianti F, Hansell A, Blangiardo M, Houthuijs D, Breugelmans O et al. (2011). Medication use in relation to noise from aircraft and road traffic in six European countries: results of the HYENA study. *Occup Environ Med*. 68:518–24.

²⁰² Jarup L, Babisch W, Houthuijs D, Pershagen G, Katsouyanni K, Cadum E et al. (2008). Hypertension and exposure to noise near airports: the HYENA study. *Environ Health Perspect*. 116(3):329–33.

Jarup L, Dudley ML, Babisch W, Houthuijs D, Swart W, Pershagen G et al. (2005). Hypertension and exposure to noise near airports (HYENA): study design and noise exposure assessment. *Environ Health Perspect*. 113(11):1473–8. Jarup et al., 2005; 2008;

²⁰³ Correia AW, Peters JL, Levy JI, Melly S, Dominici F (2013). Residential exposure to aircraft noise and hospital admissions for cardiovascular diseases: multi-airport retrospective study. *BMJ*. 347:f5561.

²⁰⁴ Hansell AL, Blangiardo M, Fortunato L, Floud S, Hoogh K de, Fecht D et al. (2013). Aircraft noise and cardiovascular disease near Heathrow airport in London: small area study. *BMJ*. 347:f5432.

²⁰⁵ Weihofen VM, Hegewald J, Euler U, Schlattmann P, Zeeb H, Seidler A. Aircraft noise and the risk of stroke. *Dtsch Arztebl Int*. 2019;116(14):237–244. doi:10.3238/arztebl.2019.0237

comprehension²⁰⁶, for children with poorer performance on standardized assessment tests²⁰⁷, and for children having poorer long-term memory²⁰⁸.

- 9.6.25 There is evidence on the relationship between exposure to aircraft noise, measured as L_{night} , and sleep disturbance. An association was found at exposure levels as low as 40 dB and over 11% of the population was characterised as highly sleep-disturbed at L_{night} levels of 40 dB. The quality of this evidence was judged by the WHO SRT to be of moderate quality.
- 9.6.26 There is also evidence that negative attitudes towards aircraft noise are especially prevalent in affected individuals who can see and hear aircraft from their house, or who fear that living in proximity of airports will have an impact on their health²⁰⁹ or property value (economic loss)²¹⁰. A lack of trust in the airport and Government authorities can enhance these negative attitudes towards airports and aircraft noise.²¹¹
- 9.6.27 The CAA publication of the 2014 Survey of Noise Attitudes (SoNA)²¹² found that around nine airports in England (including LLA) has found that $L_{Aeq,16\text{ hr}}$ for daytime noise correlates better with surveyed mean annoyance levels than L_{den} or N70 or N65 daytime events. It also provides further evidence that mean and high annoyance at given levels of aircraft noise has increased since earlier research (i.e. the ANIS study), with the implication that on the onset of significant community annoyance as previously defined in UK policy may now be at 54 dB $L_{Aeq,16\text{ hr}}$ rather than 57 dB $L_{Aeq,16\text{ hr}}$. The findings show a sharp increase in the percentage of highly annoyed between 51 - 54 and 54 - 57 dB $L_{Aeq,16\text{ hr}}$. Above 54 - 57 dB, the percentage highly annoyed broadly increases with increasing exposure level.
- 9.6.28 The SoNA report finds that self-reported health status and mental wellbeing correlate with self-reported annoyance but is not statistically significantly with noise exposure, further supporting the likely importance of annoyance / tolerance as a modifying factor in health outcomes, as opposed to a purely sound-related physiological response. Key modifying factors identified from the survey for the percentage of high annoyance at given noise levels included:
- socio-economic status (i.e. C1 and B grades were more annoyed than those in socio-economic grade E, C2, D, and A in that order);
 - individuals between 55 - 74 years old; and
 - length of residence (those resident between 1 - 5 years).

²⁰⁶ Clark C, Martin R, van Kempen E, Alfred T, Head J, Davies HW et al. (2006). Exposure effect relations between aircraft and road traffic noise exposure at school and reading comprehension – the RANCH project. *Am J Epidemiol.* 163:27–37.

²⁰⁷ Sharp B, Connor TL, McLaughlin D, Clark C, Stansfeld SA, Hervey J (2014). Assessing aircraft noise conditions affecting student learning, volume 1: final report. Washington DC: Transportation Research Board of the National Academies of Sciences, Engineering, and Medicine (<http://www.trb.org/Publications/Blurbs/170328.aspx>, accessed 5 July 2018).

²⁰⁸ Haines MM, Stansfeld SA, Job RF, Berglund B, Head J (2001b). Chronic aircraft noise exposure, stress responses, mental health and cognitive performance in school children. *Psychol Med.* 31:265–77.

²⁰⁹ Schreckenberger D, Faulbaum F, Guski R, Ninke L, Peschel C, Spielski J et al. (2015). Wirkungen von Verkehrslärm auf die Belästigung und Lebensqualität [Effects of transportation noise on noise annoyance and quality of life]. In: Gemeinütziges Umwelthaus gGmbH, editor, NORAH (Noise related annoyance cognition and health): Verkehrslärmwirkungen im Flughafenumfeld [Effect of transportation noise in the area of an airport] (vol. 3). Kelsterbach: Umwelthaus gGmbH (<https://www.norah-studie.de/en/publications.html>, accessed 4 July 2018).

²¹⁰ Bristow AL, Wardman M, Chintakayala VPK (2014). International meta-analysis of stated preference studies of transportation noise nuisance. *Transportation.* 42(1):71–100.

²¹¹ Schreckenberger D, Benz S, Belke C, Möhler U, Guski R (2017). The relationship between aircraft sound levels, noise annoyance and mental well-being: an analysis of moderated mediation. In: Proceedings. 12th International Congress on Noise as a Public Health Problem 2017 (ICBEN 2017), Zurich, Switzerland, 18–22 June 2017. Zurich: International Commission on Biological Effects of Noise.

²¹² Civil Aviation Authority (2017) The 2014 Survey of Noise Attitudes (SoNA) Technical Report [online] Available at <http://publicapps.caa.co.uk/modalapplication.aspx?appid=11&mode=detail&id=7745> [Checked October 2018]

- 9.6.29 It must also be noted that community annoyance in a residential setting is not the only potential impact of noise on quality of life; the value of access to green spaces which are areas of tranquillity has also received research attention, linking it to people's wellbeing.

9.7 Environmental measures embedded into the Proposed Scheme

- 9.7.1 A range of environmental mitigation and enhancement measures have been embedded into the Proposed Scheme. This is outlined in **Chapter 6: Air quality** (see **Section 6.8**), **Chapter 7: Climate** (see **Section 7.8**), **Chapter 8: Noise** (see **Section 8.8**) which follows the ICAO balanced approach to noise management reducing and minimising the impact of noise, and **Chapter 10: Transport** (see measures developed in the Travel Plan).

9.8 Assessment methodology

- 9.8.1 The generic project-wide approach to the assessment methodology is set out in **Chapter 4: Approach to preparing the Environmental Statement**, specifically in **Sections 4.5 to 4.7**. However, whilst this has informed the approach that has been used in this human health assessment, it is necessary to set out how this methodology has been applied, and adapted as appropriate, to address the specific needs of this assessment.
- 9.8.2 The methodology is based on emerging practice for the consideration of health in EIA. This section sets out the methods for providing reasoned conclusions for the identification and assessment of any likely significant effects of the Proposed Scheme on population health. The methods provide a framework to identify:
- the likelihood of the proposed variation to Condition 10 having an effect on health; and
 - if an effect is likely, whether it may be significant in EIA terms.
- 9.8.3 The qualitative analysis of the potential health and wellbeing effects considered:
- the nature of the effects on health determinants and their duration;
 - the size and characteristics of the populations exposed to any effects, accounting for any specific vulnerabilities;
 - review of scientific evidence linking the effects with health outcomes; and
 - the scope for mitigation of health outcomes.
- 9.8.4 The determination of significance has two stages:
- firstly, the sensitivity of the receptor affected, and the magnitude of the effect upon it are characterised. This establishes whether there is a relevant population and a relevant change in health outcomes to consider; and
 - secondly, a professional judgement is made as to whether or not the change in a population's health is significant. This judgement is based on the collection and presentation of data to evidence reasoned conclusions.
- 9.8.5 **Table 9.3** and **Table 9.4** outline sensitivity and magnitude criteria, respectively.

Table 9.3 Sensitivity criteria

Receptor sensitivity criteria	Sensitivity rating
<p>Communities with one or more of the following:</p> <ul style="list-style-type: none"> existing very low levels of physical and / or mental health; very high levels of health inequalities or inequities; very weak social and economic support networks; very high levels of deprivation; very high levels of exposure to environmental risk factors; very poor availability of or access to health and social services; very high proportion of vulnerable sub-groups (e.g. children, elderly, people with disabilities, economically inactive); and very strong views or high degrees of uncertainty about the project. <p>These communities are judged to have a very low coping capacity.</p>	Very High
<p>Communities with one or more of the following:</p> <ul style="list-style-type: none"> existing low levels of physical and / or mental health; high levels of health inequalities or inequities; weak social and economic support networks; high levels of deprivation; high levels of exposure to environmental risk factors; poor availability of or access to health and social services; high proportion of vulnerable sub-groups (e.g. children, elderly, people with disabilities, economically inactive); and strong views or high degrees of uncertainty about the project. <p>These communities are judged to have a low coping capacity.</p>	High
<p>Communities with one or more of the following:</p> <ul style="list-style-type: none"> existing moderate or average levels of physical and / or mental health; moderate or average levels of health inequalities or inequities; moderate or average levels of social and economic support networks; moderate or average levels of deprivation; moderate or average levels of exposure to environmental risk factors; moderate availability of or access to health and social services; average proportion of vulnerable sub-groups (e.g. children, elderly, people with disabilities, economically inactive); and some strong views or high degrees of uncertainty about the project. <p>These communities are judged to have a moderate coping capacity.</p>	Medium
<p>Communities with one or more of the following:</p> <ul style="list-style-type: none"> good levels of physical and / or mental health; low levels of health inequalities or inequities; good social and economic support networks; low levels of deprivation; low levels of exposure to environmental risk factors; good availability of or access to health and social services; low proportion of vulnerable sub-groups (e.g. children, elderly, people with disabilities, economically inactive); and no strong views or high degrees of uncertainty about the project. <p>These communities are judged to have a high coping capacity.</p>	Low

Table 9.4 Magnitude of change criteria

Magnitude rating	Magnitude criteria
Major	An impact that is expected to have major adverse or beneficial health effects, typically following one or more of the following: a large change in health risk (increase or decrease), affecting a large number of people, long-term in duration, permanent and irreversible, having a moderate-large or permanent effect on an activity that has important health benefits.
Moderate	An impact that is expected to have a moderate adverse or beneficial health effect, typically following one or more of the following: a moderate change in health risk (increase or decrease), affecting a moderate number of people, short-term in duration, intermittent and reversible, having a minor-moderate or long-term effect on an activity that has important health benefits.
Minor	An impact that is expected to have a minor adverse or beneficial health effect, typically following one or more of the following: a low change in health risk (increase or decrease), affecting a small number of people, temporary or short-term in duration, intermittent and reversible, having a minor or short-term effect on an activity that has important health benefits.
Negligible	An impact that is unlikely to have an effect on population or human health.

9.8.6 The assessment will characterise the relevant changes in health outcomes for each health issue. For each professional judgement on sensitivity and magnitude, the text will set out detail on the one or more relevant factors from **Table 9.3** and **Table 9.4** that informed the significance level attributed to it. The matrix employed in this assessment is shown in **Table 9.5**.

9.8.7 Significance of effect is the product of the sensitivity of receptors and magnitude of impact. Moderate, large, or very large effects are considered 'significant'.

Table 9.5 Significant effect matrix

		Magnitude of impact				
		Very Low	Low	Moderate	High	Very high
Sensitivity	Very High	Minor (Not significant)	Minor (Not significant)	Major (Significant)	Major (Significant)	Major (Significant)
	High	Minor (Not significant)	Minor (Not significant)	Moderate (Potentially significant)	Major (Significant)	Major (Significant)
	Medium	Minor (Not significant)	Minor (Not significant)	Minor (Not significant)	Moderate (Potentially significant)	Major (Significant)
	Low	Minor (Not significant)	Minor (Not significant)	Minor (Not significant)	Minor (Not significant)	Moderate (Potentially significant)
	Negligible	Minor (Not significant)	Minor (Not significant)	Minor (Not significant)	Minor (Not significant)	Minor (Not significant)

9.8.8 Modelled concentrations include the contributions from operational activity on the airport such as aircraft (including at height beyond the airport boundary) and ground support equipment (GSE), and road traffic on the modelled links (both airport-related and non-airport).

9.9 Assessment of the health effects of in-air aircraft noise

Predicted effects and their significance

Scenarios used to assess the significance of health effects of changes in noise exposure due to the proposed variation of Condition 10

- 9.9.1 The results of the noise assessment (see **Chapter 8: Noise**) and the fleet forecast (see **Appendix 3A in Volume 3: Figures and Appendices**) have informed the analysis and findings set out in this section. This includes both numbers of affected dwellings and residents (population).
- 9.9.2 The projections set out in **Chapter 3: Description of the Proposed Scheme**, show that recovery to 18 mppa is expected to occur by 2021 and reach 19 mppa by 2024.
- 9.9.3 The assessment in **Chapter 8: Noise**, shows that the worst-case year for noise exposure for residents is 2022 even though 19 mppa will only be reached in 2024. This is because of the forecasted changes in airline fleet mix from 2023 onwards which is expected to reduce noise levels even as the number of flights increases.
- 9.9.4 The assessment below focuses on the following four comparisons of the scenarios described in the temporal scope (see **Section 8.6**):
- comparison of the noise levels for the 2021 18 mppa scenario, against the existing Condition 10 limits for 2021 - 2027, using the assessment year 2021 only, showing the short-term change in noise levels prior to the increase to 19 mppa (the change in Condition 8);
 - comparison of the noise levels for the 2022 18 mppa scenario, against the worst-case year in terms of population affected (assessment year 2022), with the existing Condition 10 limits for 2021 - 2027, using the assessment year 2022 only, showing the short-term change in noise levels prior to the increase to 19 mppa (change in Condition 8);
 - comparison of the noise levels for the 2028 19 mppa scenario, against the 2028 future baseline ('do nothing') scenario using the 12.5 mppa revised fleet baseline noise estimate showing the long-term effects as would have been expected for the 2014 Planning Permission as assessed in the 2012 ES; and
 - comparison of the noise levels for the 2028 19 mppa scenario, with the future existing Condition 10 limits for 2028 onwards showing the long-term effects.

Change in noise exposure across the affected residential population

- 9.9.5 As set out in **Chapter 8: Noise**, the proposed variation to Condition 10 is expected to increase noise levels overall in the following ways:
- When comparing the 2021 18 mppa **daytime noise levels** with the existing Condition 10, for 2021, the noise assessment shows that almost all of the affected dwellings are expected to experience a small change in noise levels, either an increase or decrease, of between 0.9 to -0.9 dB $L_{Aeq\ 16hr}$. No dwellings, with noise levels between the daytime LOAEL (51 dB) and the SOAEL (63 dB), are expected to experience a 3 dB or more increase in noise. No dwellings, with noise levels above the SOAEL, are expected to experience a 1 dB or more increase in noise.
 - When comparing the 2021 18 mppa **night-time noise levels** with the existing Condition 10, for 2021, the noise assessment shows that the majority of affected dwellings are expected to experience a small change in noise levels, either an increase in noise or decrease, of between 0.9 to -0.9 dB $L_{Aeq\ 8hr}$. No dwellings, with noise levels between the night-time LOAEL (45 dB) and

the SOAEL (55 dB), are expected to experience a 3 dB or more increase in noise. Some dwellings (144), with noise levels above the SOAEL, are expected to experience a 1.0 to 1.9 dB increase in noise.

- When comparing the 2022 18 mppa **daytime noise levels** with the existing Condition 10, **the worst case scenario**, for 2022, the noise assessment shows that all the affected dwellings are expected to experience a small change in noise levels, either an increase or decrease, of between 0.9 to -0.9 dB $L_{Aeq\ 16hr}$. No dwellings, with noise levels between the daytime LOAEL (51 dB) and the SOAEL (63 dB), are expected to experience a 3 dB or more increase in noise. No dwellings, with noise levels above the SOAEL, are expected to experience a 1 dB or more increase in noise.
- When comparing the 2022 18 mppa **night-time noise levels** with the existing Condition 10, **the worst case scenario**, for 2022, the noise assessment shows that approximately half of affected dwellings are expected to experience a small change in noise levels, either an increase or decrease, of between 0.9 to -0.9 dB $L_{Aeq\ 8hr}$. No dwellings, with noise levels between the night-time LOAEL (45 dB) and the SOAEL (55 dB), are expected to experience a 3 dB or more increase in noise. Some dwellings (1,877), with noise levels above the SOAEL, are expected to experience a 1.0 to 1.9 dB increase in noise.
- When comparing the 2028 19 mppa **daytime noise levels** with the future scenario for the original 12.5 mppa, the '**do nothing option**', for 2028, the noise assessment shows that all affected dwellings are expected to experience a small change in noise levels, either an increase or decrease, of between 0.9 to -0.9 dB $L_{Aeq\ 16hr}$ only. No dwellings, with noise levels between the daytime LOAEL (51 dB) and the SOAEL (63 dB), are expected to experience a 3 dB or more increase in noise. No dwellings, with noise levels above the SOAEL, are expected to experience a 1 dB or more increase in noise.
- When comparing the 2028 19 mppa **night-time noise levels** with the future scenario for the 12.5 mppa updated 2028 future baseline, the '**do nothing option**', for 2028, the noise assessment shows that the majority of dwellings are expected to experience a small change in noise levels, either an increase or decrease, of between 0.9 to -0.9 dB $L_{Aeq\ 8hr}$. No dwellings, with noise levels between the daytime LOAEL (51 dB) and the SOAEL (63 dB), are expected to experience a 3 dB or more increase in noise. No dwellings, with noise levels above the SOAEL, are expected to experience a 1 dB or more increase in noise.
- When comparing the 2028 19 mppa **daytime noise levels** with the existing future Condition 10, for 2028, the noise assessment shows that all affected dwellings are expected to experience a small change in noise levels, either an increase or decrease, of between 0.9 to -0.9 dB $L_{Aeq\ 16hr}$. No dwellings, with noise levels between the daytime LOAEL (51 dB) and the SOAEL (63 dB), are expected to experience a 3 dB or more increase in noise. No dwellings, with noise levels above the SOAEL, are expected to experience a 1 dB or more increase in noise.
- When comparing the 2028 19 mppa **night-time noise levels** with the existing future Condition 10, for 2028, the noise assessment shows that all affected dwellings are expected to experience a small change in noise levels, either an increase or decrease, of between 0.9 to -0.9 dB $L_{Aeq\ 8hr}$ only. No dwellings, with noise levels between the daytime LOAEL (51 dB) and the SOAEL (63 dB), are expected to experience a 3 dB or more increase in noise. No dwellings, with noise levels above the SOAEL, are expected to experience a 1 dB or more increase in noise.
- There would be changes of 1 dB or more above the noise assessment threshold effect criteria for the non-residential receptors at Caddington, Park Town, Breachwood Green, St Pauls Walden, Slip End and at Stevenage Station. These significant effects are mainly predicted in 2022, except for ongoing significant effects in Park Town, Luton (until 2024) and at Slip End (until 2023).

Health effects due to the change in noise exposure across the affected residential population

- 9.9.6 As discussed in paragraphs 8.6.16 - 8.6.26, research evidence from other airports shows that an increase in noise exposure at the population level is likely to have some physical health effects leading to some additional cases of hypertension, stroke, ischaemic heart disease, and dementia. In addition, the increased noise exposure is also likely to lead to additional annoyance and sleep disturbance within the exposed population reducing mental health and wellbeing. These additional cases are likely to represent a small fraction of the existing baseline rates for these health outcomes.
- 9.9.7 A summary of the results of the assessment of the health effects from changes in noise exposure is provided in **Table 9.7**.
- 9.9.8 Percentages have been rounded up (0.5 - 0.9) or down (0.1 - 0.4) to the nearest whole number.

Affected population

Sensitivity of the affected residential population

- 9.9.9 Taking account of the existing health status of communities affected by the increase in noise, residents are judged to have a sensitivity that varies between low and high during both daytime and night-time. The health baseline shows that residents in LBC experience a range of existing health burdens. This means they have a shorter life expectancy and higher levels of mortality and morbidity from non-communicable diseases, and slightly lower levels of mental health and wellbeing. Sensitivity is therefore low for some residents, and medium, or high for others.

Change in the number of people affected in the 2021 18 mppa scenario, with the existing Condition 10 limits for 2021 - 2027, using the year 2021 only (short term effects)

- 9.9.10 More residents are affected during the night-time period than the daytime period. This is due to the lower noise thresholds for the night-time.
- 9.9.11 For the **daytime**, the comparison of the 2021 18 mppa scenario, with the existing Condition 10 limits for 2021 - 2027, shows that for 2021, for residents currently experiencing noise levels between 51 - 62.9 dB $L_{Aeq\ 16hr}$, there is expected to be an increase or decrease in noise of between 0.9 to -0.9 dB for 37,345 residents, while five residents are expected to experience an increase in noise of between 1.0 to 1.9 dB. No residents, with noise levels between the daytime LOAEL (51 dB) and the SOAEL (63 dB), are expected to experience a 3 dB or more increase in noise. For residents currently experiencing noise levels 63 dB $L_{Aeq\ 16hr}$ or more, there is expected to be an increase or decrease in noise of between 0.9 to -0.9 dB for 2,036 residents. No residents, experiencing noise levels above the SOAEL, are expected to experience a 1 dB or more increase in noise.
- 9.9.12 For the **night-time**, the comparison of the 2021 18 mppa scenario, with the existing Condition 10 limits for 2021 - 2027, shows that for 2021, for residents currently experiencing noise levels between 45 - 54.9 dB $L_{Aeq\ 16hr}$, there is expected to be an increase or decrease in noise of between 0.9 to -0.9 dB for 45,101 residents, while 9,969 residents are expected to experience an increase in noise of between 1.0 to 1.9 dB. No residents, with noise levels between the night-time LOAEL (45 dB) and the SOAEL (55 dB), are expected to experience a 3 dB or more increase in noise. For residents currently experiencing noise levels 55 dB $L_{Aeq\ 8hr}$ or more, there is expected to be an increase or decrease in noise of between 0.9 to -0.9 dB for 4,339 residents, while 277 residents are expected to experience an increase in noise of between 1.0 to 1.9 dB.

Change in the number of people affected in the 2022 18 mppa scenario, the worst-case year in terms of population affected, with the existing Condition 10 limits for 2021 - 2027, using the year 2022 only

- 9.9.13 More residents are affected during the night-time period than the daytime period. This is due to the lower noise thresholds for the night-time.
- 9.9.14 For the **daytime**, the comparison of the 2022 18 mppa scenario, with the existing Condition 10 limits for 2021 - 2027, **the worst case scenario**, shows that for 2022, for residents currently experiencing noise levels between 51 - 62.9 dB $L_{Aeq\ 16hr}$, there is expected to be an increase or decrease in noise of between 0.9 to -0.9 dB for 36,500 residents, while no residents are expected to experience an increase in noise of between 1.0 to 1.9 dB. No residents, with noise levels between the daytime LOAEL (51 dB) and the SOAEL (63 dB), are expected to experience a 3 dB or more increase in noise. For residents currently experiencing noise levels 63 dB $L_{Aeq\ 16hr}$ or more, there is expected to be an increase or decrease in noise of between 0.9 to -0.9 dB for 2,187 residents. No residents, experiencing noise levels above the SOAEL, are expected to experience a 1 dB or more increase in noise.
- 9.9.15 For the **night-time**, the comparison of the 2022 18 mppa scenario, with the existing Condition 10 limits for 2021 - 2027, **the worst case scenario**, shows that for 2022, for residents currently experiencing noise levels between 45 - 54.9 dB $L_{Aeq\ 16hr}$, there is expected to be an increase or decrease in noise of between 0.9 to -0.9 dB for 27,489 residents, while 26,268 residents are expected to experience an increase in noise of between 1.0 to 1.9 dB. No residents, with noise levels between the night-time LOAEL (45 dB) and the SOAEL (55 dB), are expected to experience a 3 dB or more increase in noise. For residents currently experiencing noise levels 55dB $L_{Aeq\ 8hr}$ or more, there is expected to be an increase or decrease in noise of between 0.9 to -0.9 dB for 80 residents, while 4,829 residents are expected to experience an increase in noise of between 1.0 to 1.9 dB.

Change in the number of people affected in the 2028 19 mppa scenario, with the 2028 future baseline ('do nothing') scenario using the 12.5 mppa revised fleet baseline noise estimate showing long term effects as would have been expected for the 2014 Planning Permission (as assessed in the 2012 ES)

- 9.9.16 More residents are affected during the night-time period than the daytime period. This is due to the lower noise thresholds for the night-time.
- 9.9.17 For the **daytime**, the comparison of 2028 19 mppa scenario, with the 2028 future baseline scenario using the 12.5 mppa revised fleet baseline, **the 'do nothing' scenario**, shows that for 2028, for residents currently experiencing noise levels between 51 - 62.9 dB $L_{Aeq\ 16hr}$, there is expected to be an increase or decrease in noise of between 0.9 to -0.9 dB for 22,994 residents, while no residents are expected to experience an increase in noise of between 1.0 to 1.9 dB. No residents, with noise levels between the daytime LOAEL (51 dB) and the SOAEL (63 dB), are expected to experience a 3 dB or more increase in noise. For residents currently experiencing noise levels 63 dB $L_{Aeq\ 16hr}$ or more, there is expected to be an increase or decrease in noise of between 0.9 to -0.9 dB for 1,201 residents. No residents, experiencing noise levels above the SOAEL, are expected to experience a 1 dB or more increase in noise.
- 9.9.18 For the **night-time**, the comparison of comparison of 2028 19 mppa scenario, with the 2028 future baseline scenario using the 12.5 mppa revised fleet baseline, **the 'do nothing' scenario**, shows that for 2028, for residents currently experiencing noise levels between 45 - 54.9 dB $L_{Aeq\ 16hr}$, there is expected to be an increase or decrease in noise of between 0.9 to -0.9 dB for 32,164 residents, while 9,138 residents are expected to experience an increase in noise of between 1.0 to 1.9 dB. No residents, with noise levels between the night-time LOAEL (45 dB) and the SOAEL (55 dB), are expected to experience a 3 dB or more increase in noise. For residents currently experiencing noise levels 55dB $L_{Aeq\ 8hr}$ or more, there is expected to be an increase or decrease in noise of between 0.9

to -0.9 dB for 3,656 residents. No residents, experiencing noise levels above the SOAEL, are expected to experience a 1 dB or more increase in noise.

Change in the number of people affected in the 2028 19 mppa scenario, with the existing Condition 10 limits for 2028 onwards showing the long-term effects

- 9.9.19 More residents are affected during the night-time period than the daytime period. This is due to the lower noise thresholds for the night-time.
- 9.9.20 For the **daytime**, the comparison of 2028 19 mppa scenario, with the Condition 10 limits for 2028 onwards, shows that for 2028, for residents currently experiencing noise levels between 51 - 62.9 dB $L_{Aeq, 16hr}$, there is expected to be an increase or decrease in noise of between 0.9 to -0.9 dB for 22,994 residents, while no residents are expected to experience an increase in noise of between 1.0 to 1.9 dB. No residents, with noise levels between the daytime LOAEL (51 dB) and the SOAEL (63 dB), are expected to experience a 3 dB or more increase in noise. For residents currently experiencing noise levels 63 dB $L_{Aeq, 16hr}$ or more, there is expected to be an increase or decrease in noise of between 0.9 to -0.9 dB for 1,201 residents. No residents, experiencing noise levels above the SOAEL, are expected to experience a 1 dB or more increase in noise.
- 9.9.21 For the **night-time**, the comparison of 2028 19 mppa scenario, with the Condition 10 limits for 2028 onwards, shows that for 2028, for residents currently experiencing noise levels between 45 - 54.9 dB $L_{Aeq, 16hr}$, there is expected to be an increase or decrease in noise of between 0.9 to -0.9 dB for 42,256 residents, while no residents are expected to experience an increase in noise of between 1.0 to 1.9 dB. No residents, with noise levels between the night-time LOAEL (45 dB) and the SOAEL (55 dB), are expected to experience a 3 dB or more increase in noise. For residents currently experiencing noise levels 55 dB $L_{Aeq, 8hr}$ or more, there is expected to be an increase or decrease in noise of between 0.9 to -0.9 dB for 3,656 residents. No residents, experiencing noise levels above the SOAEL, are expected to experience a 1 dB or more increase in noise.

Significance of 2021 and 2022 18 mppa compared with existing Condition 10 short term health effects

Significance of the 2021 and 2022 18 mppa short-term health effects across the affected residential population: daytime 51 - 62 dB $L_{Aeq, 16hr}$ and night-time 45 - 54 dB $L_{Aeq, 8hr}$

- 9.9.22 In both scenarios, for those residents experiencing an increase in noise levels between 51 – 62 dB $L_{Aeq, 16hr}$ (daytime) and between 45 – 54 dB $L_{Aeq, 8hr}$ (night-time), the residents' **sensitivity** is judged to be **low to high** during the daytime and **medium to high** during the night-time. While at the individual level the change in exposure is small (<1 dB and in some scenarios between 1.0 to 1.9 dB), across the whole affected population and considering the additional population that is affected, the magnitude of change is judged to be **low to medium adverse**. This takes into account an increase in noise exposure indoors and associated health effects (including with windows open and closed) and outdoors (changing the amenity value of public spaces); a minor magnitude of change on children's learning and cognition outdoors (outdoor play is an important part of children's learning), and a minor magnitude of change on social capital through a small reduction in social interaction and helpful behaviours. Those residents experiencing changes at the lower level of the range e.g. 51 – 53 dB $L_{Aeq, 16hr}$ may experience a lower magnitude of change.
- 9.9.23 Therefore, taking into account the range of sensitivity in residents, the large number of additional people affected at these noise levels, and the larger aggregate population health effect that is likely to be experienced, for those residents experiencing daytime noise levels between 51 – 62 dB $L_{Aeq, 16hr}$, and night-time noise levels between 45 – 54 dB $L_{Aeq, 8hr}$, **the health effect is judged to be of potentially significance (moderate)**.

Significance of the 2021 and 2022 18 mppa short term health effects across the affected residential population: daytime at or above 63 dB $L_{Aeq, 16hr}$ and night-time at or above 55 dB $L_{Aeq, 8hr}$

- 9.9.24 In both scenarios, for those residents experiencing an increase in daytime noise levels at or above 63 dB $L_{Aeq, 16hr}$ and night-time noise levels at or above 55 dB $L_{Aeq, 8hr}$, the residents' sensitivity is judged to be **medium to high**. While at the individual level the change in exposure is small (<1 dB and in some scenarios between 1.0 to 1.9 dB), across the whole affected population and considering the additional population that is affected, the magnitude of change is judged to be **medium adverse**. This takes account of the more disruptive effect of noise during sleep and consequent effects on wellbeing, work performance and learning because of lower quality sleep and the higher occurrence of health effects at these higher exposure levels.
- 9.9.25 Therefore, taking into account the range of sensitivity in residents, for those residents experiencing daytime noise levels at or above 63 dB $L_{Aeq, 16hr}$ and night-time noise levels at or above 55 dB $L_{Aeq, 8hr}$, **the health effect is judged to be of moderate significance**.
- 9.9.26 Measures to mitigate some or most of these effects for residents who are exposed to noise at or above the daytime and night-time SOAEL levels (63 and 55 dB L_{Aeq}) will be provided. This is expected to minimise the increase in noise when windows and patio doors are closed and therefore the potential adverse health effects. They will not be able to mitigate the increase in noise indoors when windows and patio doors are open. There is therefore expected to continue to be a **potentially significant (minor to moderate)** residual health effect on some residents experiencing noise above the daytime and night-time SOAEL levels, e.g. highly sensitive residents with pre-existing cardiovascular conditions and some children and older people with learning or other disabilities or chronic health conditions that may be exacerbated by increases in noise.

Significance of the 2021 and 2022 18 mppa short term health effects across the affected worker and visitor population

- 9.9.27 In both scenarios, for those workers and visitors experiencing an increase in daytime noise levels between 51 – 62 dB $L_{Aeq, 16hr}$ and night-time noise levels between 45 – 54 dB $L_{Aeq, 8hr}$, the two groups' sensitivity is judged to be **low**. As workers and, particularly, visitors are affected for relatively short periods of times (usually 8 hours or less), though there is no estimate of the numbers of workers or visitors affected, it is judged that the magnitude of change is **low adverse** for workers and visitors. This is because they have a specific reason to be in the area with immediate short-term benefits e.g. workers get paid for the work they do, visitors come to visit a site or meet family or friends. This is likely to make it easier for them to adapt to, or not discern, small increases in noise.
- 9.9.28 Therefore, for those workers and visitors experiencing daytime noise levels between 51 – 62 dB $L_{Aeq, 16hr}$ and night-time noise levels between 45 – 53 dB $L_{Aeq, 8hr}$ **the health effect is judged to be not significant**.
- 9.9.29 For those workers and visitors experiencing an increase in daytime noise levels at or above 63 dB $L_{Aeq, 16hr}$ and night-time noise levels at or above 55 dB $L_{Aeq, 8hr}$, as workers and visitors are affected for relatively short periods of times (usually 8 hours or less), the higher level of noise experienced means that the two groups' sensitivity is **medium**. Though there is no estimate of the numbers of workers or visitors affected, it is judged that the magnitude of change is **low adverse** for workers and visitors.
- 9.9.30 Therefore, for those workers and visitors experiencing daytime noise levels at or above 63 dB $L_{Aeq, 16hr}$ and night-time noise levels at or above 55 dB $L_{Aeq, 8hr}$ **the health effect is judged to be not significant**.

Significance of the 2021 and 2022 18 mppa short term health effects across noise-sensitive facilities

- 9.9.31 Noise sensitive non-residential facilities such as schools, nursing homes and hospitals are judged to have **high** sensitivity. The estimated increase in noise for the majority of non-residential noise sensitive facilities is less than 1 dB. There would be changes of 1 dB or more above the noise assessment threshold effect criteria at Caddington (Caddington Village School, Heathfield Lower School), Park Town, Breachwood Green (Breachwood Green JMI School), St Pauls Walden (All Saints Church), Slip End (Slip End Lower School) and at Stevenage Station (North Hertfordshire College). These significant effects are mainly predicted in 2022, except for ongoing significant effects in Park Town, Luton (until 2024) and at Slip End (until 2023).
- 9.9.32 From a public health perspective, noise sensitive non-residential facilities include nurseries, schools, nursing homes, hospitals, health centres and places of worship. Some schools could experience a greater magnitude of change when taking account of children's activities outdoors in school playgrounds and playing fields.
- 9.9.33 The magnitude of change Caddington, Park Town, Breachwood Green, St Pauls Walden, Slip End and at Stevenage Station is judged to be **medium to high adverse** overall.
- 9.9.34 Therefore, the health effect on noise-sensitive non-residential facilities is judged to be **significant (moderate to high)**.

Significance of the 2021 and 2022 mppa short term health effects across public open spaces and recreational green spaces

- 9.9.35 Public open spaces and recreational green spaces are judged to have **medium to high** sensitivity. Taking into account that the estimated increase in noise for the majority of these spaces is between 1 - 3 dB, the magnitude of change is judged to be **low to medium adverse**. When taking children and older people into account, public open spaces, and recreational green spaces nearer to the airport could experience a magnitude of change that is **medium adverse**.
- 9.9.36 Therefore, **the health effect on public open spaces and recreational green spaces is judged to be potentially significant (minor-moderate)**.

Significance of 2028 19 mppa compared to 12.5 mppa revised baseline, the 'do nothing' scenario, and future existing Condition 10 long term health effects

- 9.9.37 The overall numbers of residents affected between the two scenarios is very similar. The only difference is that the existing Condition 10 scenario is expected to have no residents experience a 1.0 to 1.9 dB increase compared to the 'do nothing scenario' during the night-time. The increases in noise affect a similar number of residents however residents experience lower increases in noise in the future existing Condition 10 scenario.

Significance of the 2028 long-term health effects across the affected residential population: daytime 51 - 62 dB $L_{Aeq,16hr}$ and night-time 45 - 54 dB $L_{Aeq,8hr}$

- 9.9.38 In both scenarios, for those residents experiencing an increase in noise levels between 51 – 62 dB $L_{Aeq,16hr}$ (daytime) and 45 – 54 dB $L_{Aeq,8hr}$ (night-time), the residents' sensitivity is judged to be **low to high** during the daytime and **medium to high** during the night-time. While at the individual level the change in exposure is small (<1 dB and in some scenarios 1 - 1.9 dB), across the whole affected population and considering the additional population that is affected, the magnitude of change is judged to be **low to medium adverse**. This takes into account an increase in noise exposure indoors and associated health effects (including with windows open and closed) and outdoors (changing the amenity value of public spaces); a minor magnitude of change on children's learning and cognition outdoors (outdoor play is an important part of children's learning) and a minor

magnitude of change on social capital through a small reduction in social interaction and helpful behaviours. Those residents experiencing changes at the lower level of the range e.g. 51 – 53 dB $L_{Aeq,16hr}$ may experience a lower magnitude of change.

- 9.9.39 For those residents experiencing daytime noise levels between 51 – 62 dB $L_{Aeq,16hr}$ and night-time noise levels between 45 – 54 dB $L_{Aeq,8hr}$ **the effect is judged to be of significance (moderate)**. This conclusion takes into account the long-term nature of the exposure, the range of sensitivity in residents, the large number of people affected at these noise levels, and the larger aggregate population health effect that is likely to be experienced.

Significance of the 2028 long-term health effects across the affected residential population: daytime at or above 63 dB $L_{Aeq,16hr}$ and night-time at or above 55 dB $L_{Aeq,8hr}$

- 9.9.40 In both scenarios, for those residents experiencing an increase in daytime noise levels at or above 63 dB $L_{Aeq,16hr}$ and night-time noise levels at or above 55 dB $L_{Aeq,8hr}$, the residents' sensitivity is judged to be **medium to high**. While at the individual level the change in exposure is small (<1 dB and in some scenarios 1 – 1.9 dB), across the whole affected population and considering the additional population that is affected, the magnitude of change is judged to be **medium adverse**. This takes account of the more disruptive effect of noise during sleep and consequent effects on wellbeing, work performance and learning because of lower quality sleep, and the higher occurrence of health effects at these higher exposure levels.
- 9.9.41 Therefore, taking into account, the range of sensitivity in residents, for those residents experiencing daytime noise levels at or above 63 dB $L_{Aeq,16hr}$ and night-time noise levels at or above 55 dB $L_{Aeq,8hr}$, **the health effect is judged to be of significance (moderate)**.
- 9.9.42 Measures to mitigate some or most of these effects for residents who are exposed to noise at or above the daytime and night-time SOAEL levels (63 and 55 dB L_{Aeq}) will be provided. This is expected to minimise the increase in noise when windows and patio doors are closed and therefore the potential adverse health effects. They will not be able to mitigate the increase in noise indoors when windows and patio doors are open. There is therefore expected to continue to be a **potentially significant (minor to moderate)** residual health effect on some residents experiencing noise above the daytime and night-time SOAEL levels, e.g. highly sensitive residents with pre-existing cardiovascular conditions and some children and older people with learning or other disabilities or chronic health conditions that may be exacerbated by increases in noise.

Significance of the 2028 long-term health effects across the affected worker and visitor population

- 9.9.43 Workers and visitors, in both scenarios, experiencing an increase in daytime noise levels between 51 – 62 dB $L_{Aeq,16hr}$ and night-time noise levels 45 – 54 dB $L_{Aeq,8hr}$, the two groups' sensitivity is judged to be **low**. As they are affected for relatively short periods of time (usually 8 hours or less). Though there is no estimate of the numbers of workers or visitors affected, it is judged that the magnitude of change is **low adverse** for workers and visitors. This is because they have a specific reason to be in the area with immediate short-term benefits e.g. workers get paid for the work they do, and visitors come to visit a site or meet family or friends. This is likely to make it easier for them to adapt to, or not discern, small increases in noise.
- 9.9.44 Therefore, for those workers and visitors experiencing daytime noise levels between 51 – 62 dB $L_{Aeq,16hr}$ and night-time noise levels between 45 – 53 dB $L_{Aeq,8hr}$ **the health effect is judged to be not significant**.
- 9.9.45 Workers and visitors experiencing an increase in daytime noise levels at or above 63 dB $L_{Aeq,16hr}$ and night-time noise levels at or above 55 dB $L_{Aeq,8hr}$, are affected for relatively short periods of times (usually 8 hours or less). The higher level of noise experienced means that the sensitivity of these

two groups is therefore medium. Though there is no estimate of the numbers of workers or visitors affected, it is judged that the magnitude of change is **low adverse** for workers and visitors.

- 9.9.46 Therefore, for those workers and visitors experiencing daytime noise levels at or above 63 dB $L_{Aeq,16hr}$, and night-time noise levels at or above 55 dB $L_{Aeq,8hr}$ **the health effect is judged to be not significant.**

Significance of the 2028 long term health effects across noise-sensitive facilities

- 9.9.47 Noise sensitive non-residential facilities such as schools, nursing homes and hospitals are judged to have **high** sensitivity. The estimated increase in noise for all the non-residential noise sensitive facilities is less than 1 dB (between 0.1 - 0.7 dB for the existing future Condition 10 scenario).
- 9.9.48 From a public health perspective, noise sensitive non-residential facilities include nurseries, schools, nursing homes, hospitals, health centres and places of worship. Some schools could experience a greater magnitude of change when taking account of children's activities outdoors in school playgrounds and playing fields.
- 9.9.49 The magnitude of is judged to be **very low** overall.
- 9.9.50 Therefore, the health effect on noise-sensitive non-residential facilities is judged to be **not significant.**

Significance of the 2028 long term health effects across public open spaces and recreational green spaces

- 9.9.51 Public open spaces and recreational green spaces are judged to have **medium sensitivity**. Taking into account that the estimated increase in noise for the majority of these spaces is between 1 – 3 dB, the magnitude of change is judged to be **low-medium adverse**. When taking children and older people into account, public open spaces, and recreational green spaces nearer to the airport could experience a magnitude of change that is **medium adverse**.
- 9.9.52 Therefore, **the effect on public open spaces and recreational green spaces is judged to be of significance (minor-moderate).**

Table 9.6 Summary of significance of adverse and beneficial health effects

Receptor and summary of predicted effects	Sensitivity/ importance/ value of receptor ¹	Magnitude of change ²	Significance ³	Summary rationale
Significance of 2021 and 2022 18 mppa compared with existing Condition 10 short term health effects 51 - 62 dB _{Laeq,16hr} (DAYTIME) and 45 - 54 dB _{Laeq,8hr} (NIGHT-TIME) exposure				
Residents affected by an increase in noise between 51 - 62 dB LAeq 16hr (DAYTIME)	Low - High	Low - Medium Adverse	Moderate (Potentially Significant)	<p>The health baseline shows that residents in LBC experience a range of existing health burdens which mean they have a shorter life expectancy and higher levels of mortality and morbidity from non-communicable diseases and slightly lower levels of mental health and wellbeing. Sensitivity is therefore low for some residents and medium - high for others.</p> <p>While the individual level increase in noise is small, a 1-2 dB change, across the whole affected population, the change in magnitude is judged to be minor to moderate adverse. The significance of effect is moderate as it includes both an increase in noise exposure indoors (including with windows open and closed) as well as outdoors (amenity value of public open and recreational green spaces).</p>
Residents affected by an increase in noise between 45 - 54 dB LAeq 8hr (NIGHT-TIME)	Medium - High	Low - Medium Adverse	Moderate (Potentially Significant)	Same as above except that sensitivity is medium as noise at night has greater effects than the same level of noise during the day.
Workers and visitors affected by an increase in noise between 51 - 62 dB LAeq 16hr (DAYTIME)	Low	Low Adverse	Minor (Not significant)	As workers and especially visitors are affected for relatively short periods of times usually 8 hours or less the sensitivity of these two groups is low. There are no estimates of the numbers of workers or visitors affected. Magnitude is judged to be minor for workers and visitors because they have a specific reason to be in the area with immediate short-term benefits which make it easier for them to adapt to, or not discern, small increases in noise.
Workers and visitors affected by an increase in noise between 45 - 54 dB LAeq 8hr (NIGHT-TIME)	Low	Low Adverse	Minor (Not significant)	As workers and especially visitors are affected for relatively short periods of times usually 8 hours or less the sensitivity of these two groups is low. There are no estimates of the numbers of workers or visitors affected. Magnitude is judged to be minor for workers and visitors because they have a specific reason to be in the area with

Receptor and summary of predicted effects	Sensitivity/ importance/ value of receptor ¹	Magnitude of change ²	Significance ³	Summary rationale
				immediate short-term benefits which make it easier for them to adapt to, or not discern, small increases in noise.
Significance of 2021 and 2022 18 mppa compared with existing Condition 10 short term health effects 63-68 dB LAeq 16hr (DAYTIME) and 55-62 dB LAeq 8hr (NIGHT-TIME) exposure				
Residents affected by an increase in noise between 63 - 68 dB LAeq 16hr (DAYTIME)	Medium - High	Medium Adverse	Moderate (Significant)	As for residents above. The judgment on the magnitude of change takes account of the proposed mitigation. However, there is a potential for moderate significance residual effects. LLA will provide noise insulation to reduce noise exposure indoors though this insulation will not reduce the noise exposure indoors with windows open and noise exposure outdoors, of residents exposed to noise at or above 63 dB LAeq 16hr daytime and 55 dB LAeq 8 hr night-time.
Residents affected by an increase in noise between 55 - 62 dB LAeq 8hr (NIGHT-TIME)	Medium - High	Medium Adverse	Moderate (Significant)	As for residents above. The judgment on the magnitude of change takes account of the proposed mitigation. However, there is a potential for moderate significance residual effects. LLA will provide noise insulation to reduce noise exposure indoors though this insulation will not reduce the noise exposure indoors with windows open and noise exposure outdoors, of residents exposed to noise at or above 63 dB LAeq 16hr daytime and 55 dB LAeq 8 hr night-time.
Workers and visitors affected by an increase in noise between 63 - 68 dB LAeq 16hr (DAYTIME)	Medium	Low Adverse	Minor (Not significant)	As workers and especially visitors are affected for relatively short periods of times usually 8 hours or less, the sensitivity of these two groups is low. Magnitude is judged to be minor for workers and visitors because they have a specific reason to be in the area with immediate short-term benefits which make it easier for them to adapt to small increases in noise.
Workers and visitors affected by an increase in noise between 55 - 62 dB LAeq 8hr (NIGHT-TIME)	Medium	Low Adverse	Minor (Not significant)	As workers and especially visitors are affected for relatively short periods of times usually 8 hours or less, the sensitivity of these two groups is low. Magnitude is judged to be minor for workers and visitors because they have a specific reason to be in the area with immediate short-term benefits which make it easier for them to adapt to small increases in noise.

Receptor and summary of predicted effects	Sensitivity/ importance/ value of receptor ¹	Magnitude of change ²	Significance ³	Summary rationale
Significance of 2021 and 2022 18 mppa compared with existing Condition 10 short term health effects 51 - 62 dB _{L_{Aeq} 16hr} (DAYTIME) and 45 - 54 dB _{L_{Aeq} 8hr} (NIGHT-TIME) exposure and 63 - 68 dB _{L_{Aeq} 16hr} (DAYTIME) and 55 - 62 dB _{L_{Aeq} 8hr} (NIGHT-TIME) exposure				
Noise-sensitive non-residential facilities (at each facility)	High	Medium to High Adverse	Major (Significant)	<p>The estimated increase in noise for the majority of non-residential noise sensitive facilities is less than 1 dB. This would have a high sensitivity when taking into account children and older people and those with pre-existing health conditions and disabilities who may use these spaces. There would be changes of 1 dB or more above the noise assessment threshold effect criteria at Caddington (Caddington Village School, Heathfield Lower School), Park Town, Breachwood Green (Breachwood Green JMI School), St Pauls Walden (All Saints Church), Slip End (Slip End Lower School) and at Stevenage Station (North Hertfordshire College). These significant effects are mainly predicted in 2022, except for ongoing significant effects in Park Town, Luton to 2024 and at Slip End to 2023.</p> <p>From a public health perspective, noise sensitive non-residential facilities include nurseries, schools, nursing homes, hospitals, health centres and places of worship. Some schools could experience a greater magnitude of change when taking account of children's activities outdoors in school playgrounds and playing fields.</p>
Public open spaces and recreational green spaces	Medium - High	Low - Medium Adverse	Minor – Moderate (Potentially significant)	<p>Public open spaces and recreational green spaces have a moderate to high sensitivity when taking into account children and older people and those with pre-existing health conditions and disabilities who may use these spaces. The magnitude of effect for the 1 - 2 dB increase in noise is judged to be minor to moderate adverse. When taking children and older people into account, public open spaces and recreational green spaces nearer to the airport could experience a magnitude of change that is moderate adverse.</p>
Significance of 2028 19 mppa compared to 12.5 mppa revised baseline and future Condition 10 long term health effects 51 - 62 dB _{L_{Aeq} 16hr} (DAYTIME) and 45 - 54 dB _{L_{Aeq} 8hr} (NIGHT-TIME) exposure				
Residents affected by an increase in noise between 51 - 62 dB _{L_{Aeq} 16hr} (DAYTIME)	Low - High	Low - Medium Adverse	Moderate (Significant)	<p>While the individual level increase in noise is small (a 1 - 2 dB change), across the whole affected population, the change in magnitude is judged to be minor to moderate adverse. The significance of effect is moderate as it includes both an increase in noise exposure indoors</p>

Receptor and summary of predicted effects	Sensitivity/ importance/ value of receptor ¹	Magnitude of change ²	Significance ³	Summary rationale
				(including with windows open and closed) as well as outdoors (amenity value of public open and recreational green spaces).
Residents affected by an increase in noise between 45 - 54 dB LAeq 8hr (NIGHT-TIME)	Medium - High	Low - Medium Adverse	Moderate (Significant)	Same as above except that sensitivity is medium as noise at night has greater effects than the same level of noise during the day.
Workers and visitors affected by an increase in noise between 51 - 62 dB LAeq 16hr (DAYTIME)	Low	Low Adverse	Minor (Not significant)	As workers and especially visitors are affected for relatively short periods of times usually 8 hours or less the sensitivity of these two groups is low. There are no estimates of the numbers of workers or visitors affected. Magnitude is judged to be minor for workers and visitors because they have a specific reason to be in the area with immediate short-term benefits which make it easier for them to adapt to, or not discern, small increases in noise.
Workers and visitors affected by an increase in noise between 45 - 54 dB LAeq 8hr (NIGHT-TIME)	Low	Low Adverse	Minor (Not significant)	As workers and especially visitors are affected for relatively short periods of times usually 8 hours or less the sensitivity of these two groups is low. There are no estimates of the numbers of workers or visitors affected. Magnitude is judged to be minor for workers and visitors because they have a specific reason to be in the area with immediate short-term benefits which make it easier for them to adapt to, or not discern, small increases in noise.
Significance of 2028 19 mppa compared to 12.5 mppa revised baseline and future Condition 10 long term health effects 63 - 68 dB LAeq 16hr (DAYTIME) and 55 - 62 dB LAeq 8hr (NIGHT-TIME) exposure				
Residents affected by an increase in noise between 63 - 68 dB LAeq 16hr (DAYTIME)	Medium - High	Medium Adverse	Moderate (Significant)	As for residents above. The judgment on the magnitude of change takes account of the proposed mitigation. However, there is a potential for moderate significance residual effects. LLA will provide noise insulation to reduce noise exposure indoors though this insulation will not reduce the noise exposure indoors with windows open and noise exposure outdoors, of residents exposed to noise at or above 63 dB LAeq 16hr daytime and 55 dB LAeq 8 hr night-time.
Residents affected by an increase in noise between 55 - 62 dB LAeq 8hr (NIGHT-TIME)	Medium - High	Medium Adverse	Moderate (Significant)	As for residents above. The judgment on the magnitude of change takes account of the proposed mitigation. However, there is a potential for moderate significance residual effects.

Receptor and summary of predicted effects	Sensitivity/ importance/ value of receptor ¹	Magnitude of change ²	Significance ³	Summary rationale
				LLA will provide noise insulation to reduce noise exposure indoors though this insulation will not reduce the noise exposure indoors with windows open and noise exposure outdoors, of residents exposed to noise at or above 63 dB LAeq 16hr daytime and 55 dB LAeq 8 hr night-time.
Workers and visitors affected by an increase in noise between 63 - 68 dB LAeq 16hr (DAYTIME)	Medium	Low Adverse	Minor (Not significant)	As workers and especially visitors are affected for relatively short periods of times usually 8 hours or less the sensitivity of these two groups is low. Magnitude is judged to be minor for workers and visitors because they have a specific reason to be in the area with immediate short-term benefits which make it easier for them to adapt to small increases in noise.
Workers and visitors affected by an increase in noise between 55 - 62 dB LAeq 8hr (NIGHT-TIME)	Medium	Low Adverse	Minor (Not significant)	As workers and especially visitors are affected for relatively short periods of times usually 8 hours or less the sensitivity of these two groups is low. Magnitude is judged to be minor for workers and visitors because they have a specific reason to be in the area with immediate short-term benefits which make it easier for them to adapt to small increases in noise.
Significance of 2028 19 mppa compared to 12.5 mppa revised baseline and future Condition 10 long term health effects 51 - 62 dB LAeq 16hr (DAYTIME) and 45 - 54 dB LAeq 8hr (NIGHT-TIME) exposure and 63 - 68 dB LAeq 16hr (DAYTIME) and 55 - 62 dB LAeq 8hr (NIGHT-TIME) exposure				
Noise-sensitive non-residential facilities (at each facility)	High	Very Low Adverse	Minor (Not significant)	<p>The estimated increase in noise for all the non-residential noise sensitive facilities is less than 1 dB (between 0.1 - 0.7 dB for the existing future Condition 10 scenario). This would have a high sensitivity when taking into account children and older people and those with pre-existing health conditions and disabilities who may use these spaces.</p> <p>From a public health perspective, noise sensitive non-residential facilities include nurseries, schools, nursing homes, hospitals, health centres and places of worship. Some schools could experience a greater magnitude of change when taking account of children's activities outdoors in school playgrounds and playing fields.</p>
Public open spaces and recreational green spaces	Medium - High	Low - Medium Adverse	Minor – Moderate	Public open spaces and recreational green spaces have a moderate to high sensitivity when taking into account children and older people

Receptor and summary of predicted effects	Sensitivity/ importance/ value of receptor ¹	Magnitude of change ²	Significance ³	Summary rationale
			(Potentially significant)	and those with pre-existing health conditions and disabilities who may use these spaces. The magnitude of effect for the 1 - 3dB increase in noise is judged to be a minor to moderate adverse. When taking children and older people into account, public open spaces, and recreational green spaces nearer to the airport could experience a magnitude of change that is moderate adverse.

1. The sensitivity / importance / value of a receptor is defined using the criteria set out in **Section 9.8** above and is defined as low, medium, high, and very high.
2. The magnitude of change on a receptor resulting from activities relating to the development is defined using the criteria set out in **Section 9.8** above and is defined as major, moderate, minor, and negligible.
3. The significance of the environmental effects is based on the combination of the sensitivity / importance / value of a receptor and the magnitude of change and is expressed as major (significant), moderate (probably significant) or minor / negligible (not significant), subject to the evaluation methodology outlined in **Section 9.8**.

9.10 Assessment of cumulative effects

- 9.10.1 As outlined in **Section 4.8**, consideration has been given as to whether any of the health receptors that have been taken forward for assessment in this chapter are likely to be subject to cumulative health effects because of the noise effects generated by 'other developments'. However, no 'other developments' have been identified within the study area of this assessment that would contribute to a cumulative health impact. **No likely significant inter-project effects** are predicted to occur from the Proposed Scheme together with 'other developments'.
- 9.10.2 The potential for inter-related effects has been identified at receptors that could experience health and noise effects, and these are reported in **Section 9.9**. This is because the Health assessment is by its nature cumulative, as it assesses the effects on a variety of determinants of health, such as exposure to noise, and changes in air quality and climatic effects.
- 9.10.3 The air quality, climate, and transport assessments have identified that no likely significant effects are predicted to occur. **No likely significant intra-project effects** involving cumulative health interactions with these aspects are therefore predicted to occur from the Proposed Scheme.

9.11 Conclusions of significance evaluation

- 9.11.1 The 2012 ES of the 2014 Planning Permission described and assessed a range of beneficial as well as adverse health effects and associated mitigation and enhancement measures which continue to apply.
- 9.11.2 This health assessment has focused solely on the health effects of the change in noise exposure. Therefore, the findings of this chapter should be read alongside the health-related findings of the 2012 ES of the 2014 Planning Permission.
- 9.11.3 While at the individual-level the change in noise exposure is estimated to be small and not result in individual-level measurable health effects, at the population level, the health effects are measurable because of the larger size of the exposed population subject to small changes in noise exposure.
- 9.11.4 The health effects related to the change in noise exposure linked to the proposed Condition 10 variation is judged overall, to continue to have an adverse health effect at the population level that is of **moderate significance** in the assessment years 2021, 2022, and 2028.
- 9.11.5 Measures to mitigate some or most of these effects for residents who are exposed to noise at or above the daytime and night-time SOAEL levels (63 and 55 dB LAeq) will be provided. This is expected to minimise the increase in noise when windows and patio doors are closed and therefore the potential adverse health effects. They will not be able to mitigate the increase in noise indoors when windows and patio doors are open. There is therefore expected to continue to be a **potentially significant (minor to moderate)** residual health effect on some residents experiencing noise above the daytime and night-time SOAEL levels, e.g. highly sensitive residents with pre-existing cardiovascular conditions and some children and older people with learning or other disabilities or chronic health conditions that may be exacerbated by increases in noise.

9.12 Implementation of environmental measures

- 9.12.1 **Table 9.7** describes the environmental measures proposed to mitigate the health impacts of the Proposed Scheme and the means by which they will be implemented.

Table 9.7 Summary of environmental measures to be implemented – relating to noise

Environmental measure	Responsibility for implementation	ES section reference
LLAOL will contribute to the Noise Insulation Fund with an initial budget of £400,000 in 2021, £900,000 in 2022, £700,000 in 2023 and £100,000 each year afterwards to 2028 inclusive.	LLAOL	Noise Chapter Section 8.14

10. Transport

10.1 Introduction

- 10.1.1 This chapter of the ES assesses the likely significant effects of the Proposed Scheme with respect to transport. The chapter should be read in conjunction with **Chapter 3: Description of the Proposed Scheme**. This transport assessment has assessed the likely significant effects arising from the proposed change to Condition 8, which increases the passenger throughput cap, as agreed with LBC (see **Section 4.4**). This is because, it is the operational changes arising from this condition that generate additional surface access movements from a variety of transport modes. This chapter supplements the transport chapter in the 2014 Planning Permission 2012 ES.
- 10.1.2 To carry out an assessment of the transport related impacts of an increase in passenger numbers, three main documents have been prepared to support the Proposed Scheme. These are a Transport Assessment (TA), a Travel Plan (TP), and a Car Parking Management Plan (CPMP).
- 10.1.3 The TA follows on from the 2012 ES which assessed the impact of the June 2014 Planning Permission 2014 Planning Permission allow capacity at the LLA to increase to 18 mppa by 2026/27. Current forecasts indicate that passenger demand already reached close to 18 mppa in October 2019. LLAOL has proposed to raise the passenger cap from 18 mppa to 19 mppa as soon as possible to ensure that the airport can continue to grow over the next few years, with 19 mppa now expected to be reached in 2024.
- 10.1.4 As part of this growth, a key component identified for further assessment is surface access and car parking. This assessment seeks to demonstrate that increasing passenger numbers can be satisfactorily accommodated on the highway network (on and off airport) and through adequate sustainable transport measures. Impact on public transport access has also been assessed.
- 10.1.5 The TP was developed with the objective of reviewing the latest Airport Surface Access Strategy Report (ASAS)²¹³ and updating objectives, targets and measures based on a policy appraisal and site assessment. This assessment has been translated into a concrete action plan to be monitored periodically.
- 10.1.6 The CPMP was produced to set out what available parking supply will be available to LLAOL for 19 mppa and how the existing car parks would be managed to operate at this increased capacity. No further capacity increases in car parking are proposed from the Proposed Scheme.

10.2 Limitations of this assessment

- 10.2.1 The COVID-19 Pandemic presented a limitation for this assessment as it has added a degree of uncertainty in the aviation and transport sector. However, based on the experts' analysis of potential recovery scenarios, this was mitigated with the assumption that passenger volumes and numbers will return to current levels by 2023.

²¹³ London Luton Airport, Airport Surface Access Strategy Report (ASAS) 2018 -2022 (2019). Available [online] at: <https://www.london-luton.co.uk/corporate/lla-publications/surface-access-strategy> [Accessed 23 November 2020].

10.3 Relevant legislation, planning policy, technical guidance

Planning policy context

National policies

Decarbonising Transport: Setting the Challenge

- 10.3.1 The Decarbonising Transport: Setting the Challenge²¹⁴ (also referred to as the Transport Decarbonisation Plan (TDP)) sets out the Government's ambitious plan to accelerate the decarbonisation of transport. The document sets out in detail what Government, business, and society will need to do to deliver the significant emission reductions needed across all modes of transport. All in line with the target of achieving carbon budgets and net zero emissions across every transport mode by 2050.
- 10.3.2 In terms of aviation, the following policies included in the TDP are of relevance to this document:
- "2.47 Aviation, at present, is a relatively small contributor to domestic UK GHG emissions. Its proportional contribution is expected to increase significantly as other sectors decarbonise more quickly."*
- "2.49 Airport expansion is a core part of boosting our global connectivity and levelling up across the UK. The Government takes seriously its commitments on the environment and the expansion of any airport must always be within the UK's environmental obligations."*
- "2.51 Given their global nature and the absence of any international agreement on how to assign international aviation emissions to individual states, action at an international level is the Government's preferred approach for addressing aviation's international carbon emissions."*
- "2.52 The UK is already a respected and influential member of the UN International Civil Aviation Organisation (ICAO). The UK has been instrumental in securing many important environmental agreements including the 2016 Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) agreement – the first worldwide scheme to address CO₂ emissions in any single sector – and the CO₂ standard."*
- "2.53 ICAO has defined a basket of measures designed to achieve its medium-term goal of carbon neutral growth for the sector from 2020 (CNG2020). This consists of more efficient aircraft technologies as incentivised by the CO₂ standard, operational improvements such as more efficient flight procedures, the development and use of sustainable alternative fuels and market-based measures like CORSIA."*
- "2.54 Under CORSIA, qualifying aeroplane operators are required to offset the growth in international aviation CO₂ emissions covered by the scheme above average 2019 and 2020 levels. At present, 82 states (including the UK) have volunteered to join CORSIA from the start in 2021, representing over 75% of international aviation activity. From 2027 to 2035, the scheme will become mandatory, meaning that over the entire lifecycle of the scheme (2021 to 2035), it is estimated that approximately 2.5Gt of CO₂ will be offset. Since 2012, the aviation sector has been part of the EU Emissions Trading System (ETS). According to the European Commission, this has contributed to reducing Europe's carbon footprint by more than 17MtCO₂e per year. The UK*

²¹⁴ Department for Transport: Decarbonising Transport: Setting the Challenge (2020). Available [online] at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/932122/decarbonising-transport-setting-the-challenge.pdf [Accessed 23 November 2020].

committed in its 2017 Clean Growth Strategy that its future approach would be at least as ambitious as the EU ETS and provide a smooth transition for relevant sectors."

National Planning Policy Framework

10.3.3 The National Planning Policy Framework (NPPF)²¹⁵ was introduced in March 2012 and updated in February 2019. The NPPF brings the Governments' planning policies for England into a single document and describes how it expects these to be applied. The purpose of the planning system is to contribute to the achievement of sustainable development.

10.3.4 Transport elements of the document are covered in Chapter 9 – Promoting Sustainable transport. The NPPF states in paragraph 111:

"All developments that will generate significant amounts of movement should be required to provide a travel plan, and the application should be supported by a transport statement or transport assessment so that the likely impacts of the proposal can be assessed."

10.3.5 In paragraph 102 of Chapter 9, the NPPF states that:

"Transport issues should be considered from the earliest stages of plan-making and development proposals, so that:

- ▶ *the potential impacts of development on transport networks can be addressed;*
- ▶ *opportunities from existing or proposed transport infrastructure, and changing transport technology and usage, are realised – for example in relation to the scale, location or density of development that can be accommodated;*
- ▶ *opportunities to promote walking, cycling and public transport use are identified and pursued;*
- ▶ *the environmental impacts of traffic and transport infrastructure can be identified, assessed and taken into account – including appropriate opportunities for avoiding and mitigating any adverse effects, and for net environmental gains; and*
- ▶ *patterns of movement, streets, parking and other transport considerations are integral to the design of schemes, and contribute to making high quality places."*

10.3.6 The NPPF, in paragraph 104, recognises that planning policies should:

"Support an appropriate mix of uses across an area, and within larger scale sites, to minimise the number and length of journeys needed for employment, shopping, leisure, education and other activities;

- ▶ *Be prepared with the active involvement of local highways authorities, other transport infrastructure providers and operators and neighbouring councils, so that strategies and investments for supporting sustainable transport and development patterns are aligned;*
- ▶ *Identify and protect, where there is robust evidence, sites and routes which could be critical in developing infrastructure to widen transport choice and realise opportunities for large scale development;*
- ▶ *Provide for high quality walking and cycling networks and supporting facilities such as cycle parking (drawing on Local Cycling and Walking Infrastructure Plans);*

²¹⁵ Ministry of Housing, Communities & Local Government (2019). National Planning Policy Framework, [online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/779764/NPPF_Feb_2019_web.pdf [Checked March 2019].

- ▶ *Provide for any large-scale transport facilities that need to be located in the area, and the infrastructure and wider development required to support their operation, expansion and contribution to the wider economy. In doing so they should take into account whether such development is likely to be a nationally significant infrastructure project and any relevant national policy statements; and*
- ▶ *Recognise the importance of maintaining a national network of general aviation airfields, and their need to adapt and change over time – taking into account their economic value in serving business, leisure, training and emergency service needs, and the Government's General Aviation Strategy."*

10.3.7 Paragraph 108 states that:

"In assessing sites that may be allocated for development in plans, or specific applications for development, it should be ensured that:

- ▶ *appropriate opportunities to promote sustainable transport modes can be – or have been – taken up, given the type of development and its location;*
- ▶ *safe and suitable access to the site can be achieved for all users; and*
- ▶ *any significant impacts from the development on the transport network (in terms of capacity and congestion), or on highway safety, can be cost effectively mitigated to an acceptable degree."*

10.3.8 Paragraph 109 states that:

"Development should only be prevented or refused on highways grounds if there would be an unacceptable impact on highway safety, or the residual cumulative impacts on the road network would be severe."

10.3.9 In paragraph 110, the NPPF states that in assessing sites for development, consideration should be given to the promotion of sustainable transport modes, safe and suitable access routes by all transport modes, and mitigation of any potentially significant impacts on the transport network. Applications for development should:

"Give priority first to pedestrian and cycle movements, both within the scheme and with neighbouring areas; and second – so far as possible – to facilitating access to high quality public transport, with layouts that maximise the catchment area for bus or other public transport services, and appropriate facilities that encourage public transport use;

- ▶ *Address the needs of people with disabilities and reduced mobility in relation to all modes of transport;*
- ▶ *Create places that are safe, secure and attractive – which minimise the scope for conflicts between pedestrians, cyclists and vehicles, avoid unnecessary street clutter, and respond to local character and design standards;*
- ▶ *Allow for the efficient delivery of goods, and access by service and emergency vehicles; and*
- ▶ *Be designed to enable charging of plug-in and other ultra-low emission vehicles in safe, accessible and convenient locations."*

National Planning Practice Guidance

- 10.3.10 The National Planning Practice Guidance (NPPG)²¹⁶ web-based resource related to Travel Plans, Transport Assessments, and Statements was launched in March 2014. Together with the NPPF, these documents set out the Government's overall planning policy framework. With specific regard to transport assessment, the NPPG includes a section on travel plans, transport assessment and statements in decision making.
- 10.3.11 The NPPG gives details on what travel plans, transport assessments and statements are, how they are related, why they are important, and when they need to be undertaken. In relation to a transport assessment specifically, the NPPG states:

"In determining whether a Transport Assessment or Statement will be needed for a proposed development, local planning authorities should take into account the following considerations:

- ▶ *The Transport Assessment and Statement policies (if any) of the Local Plan; the scale of the proposed development and its potential for additional trip generation (smaller applications with limited impacts may not need a Transport Assessment or Statement);*
- ▶ *Existing intensity of transport use and the availability of public transport;*
- ▶ *Proximity to nearby environmental designations or sensitive areas;*
- ▶ *Impact on other priorities/strategies (such as promoting walking and cycling);*
- ▶ *The cumulative impacts of multiple developments within a particular area; and*
- ▶ *Whether there are particular types of impacts around which to focus the Transport Assessment or Statement (e.g. assessing traffic generated at peak times)."*

Aviation 2050: The Future of UK Aviation – Green Paper

- 10.3.12 As part of the Governments long term development of an Aviation Strategy to 2050, the 'Aviation 2050: The Future of UK Aviation' document²¹⁷ focuses on updating objectives following feedback received on their relevance and priority. The document aims to help deliver "a safe, secure and sustainable aviation sector that meets the needs of consumers and of a global, outward-looking Britain".
- 10.3.13 The objectives are to:
- help the aviation industry work for its customers;
 - ensure a safe and secure way to travel;
 - build a global and connected Britain;
 - encourage competitive markets;
 - support growth while tackling environmental impacts; and
 - develop innovation, technology, and skills.
- 10.3.14 This was a consultation document; a consultation response was issued in October 2019.

²¹⁶ Ministry of Housing, Communities & Local Government (2014). Planning Practice Guidance. Available [online] at: <https://www.gov.uk/government/collections/planning-practice-guidance> [Accessed 23 November 2020].

²¹⁷ Committee on Climate Change. (2009). Meeting the UK aviation target – options for reducing emissions to 2050. [online]. Available at: <https://www.theccc.org.uk/wp-content/uploads/2009/12/CCC-Meeting-the-UK-Aviation-target-2009.pdf> [Accessed 21 October 2020].

Aviation 2050: The Future of UK Aviation – Consultation Response

- 10.3.15 After the document *Aviation 2050- The future of UK aviation* closed its consultation on 11 April 2019, a response document was issued by the Government in October 2019.
- 10.3.16 Based on the consultation responses, the Government, in paragraphs 15 - 22 of the response document, recognises that:
- ▶ *"there is an immediate challenge in the south of the UK to coordinate multiple airspace changes across different airports in order to modernise our highly congested airspace. Multiple airports across the South East, as well as NERL, are therefore preparing to bring forward the Future Airspace Strategy Implementation- South (FASI-South) Programme of airspace changes in the next few years.*
 - ▶ *NERL have been commissioned by the DfT and the CAA, as co-sponsors of airspace modernisation, to create an Airspace Change Organising Group(ACOG) that will initially coordinate the FASI-South Programme. ACOG will also take on the coordination role for the FASI-North Programme in December 2019.*
 - ▶ *ACOG will support NERL in creating a single coordinated implementation plan for airspace changes in the South of the UK (masterplan for short). The CAA intends to add NERL's role in creating a masterplan and in establishing and maintaining ACOG as a condition in their en-route licence, as part of Reference Period 3.*
 - ▶ *The purpose of the masterplan is to set out where airspace change could be taken forward to provide benefits, to consider potential conflicts, trade-offs and interdependencies, and set out a preferred implementation plan. It will not include detail of individual airspace designs or solutions.*
 - ▶ *The masterplan will identify where airspace changes are needed to deliver safety, capacity, noise reduction, improvements to air quality, fuel efficiency, and improved access to airspace for GA or the military, or to introduce new technology. The development of the masterplan will be an iterative process.*
 - ▶ *While the current masterplan being developed will include changes required in the south, in future, the masterplan will be extended to cover the north of the UK.*
 - ▶ *The government's intention is to use the proposed powers solely for ACPs that will deliver the CAA's strategy and plan under Air Navigation Direction 3(e). Initially, the way that the government plans to do this, is through only using the powers in respect of ACPs that have been identified as part of the airspace change masterplan (which, once accepted by the co-sponsors CAA and DfT, will be one part of the CAA's overarching strategy and plan).*
 - ▶ *This means that the legislation will allow the government to use the powers to progress ACPs that were not in the masterplan, but were necessary to deliver the CAA's broader strategy and plan if it wished to do so in the future. If it decided to do so, it would make this clear."*
- 10.3.17 Next steps to implement the new policy are stated in paragraphs 27 and 28 of the consultation response, as follows:
- ▶ *"The government intends to introduce the policy in primary legislation. Aviation, including airspace, is a reserved matter and the proposed policy will apply to the whole of the UK.*
 - ▶ *The CAA will develop guidance on how they would monitor the progress of the ACPs within the masterplan and therefore the basis of any advice to use the powers. This will include setting out the process that the CAA's oversight team will take before recommending the use of the powers."*

Airports National Policy Statement

- 10.3.18 The Airports National Policy Statement (ANPS)²¹⁸ was published by the Government in 2018 to provide the Secretary of State with the primary basis to make decisions on any development consent application for a new runway at Heathrow Airport. In the context of this proposal, it is noted that the ANPS states also that the document would be a "*relevant consideration in respect of applications for new runway capacity and other airport infrastructure in London and the South East of England*", and therefore, potentially, to the Proposed Scheme at Luton Airport.
- 10.3.19 The landmark Appeal Court decision R (on the application of Plan B Earth and others) v Secretary of State for Transport [2020] EWCA Civ 214 of 27 February 2020 declared that government policy in relation to the expansion of Heathrow Airport was unlawful. This decision has now been overturned by the Supreme Court.
- 10.3.20 In any event, given the policy scope of the ANPS (in respect of 'runway capacity and other airport infrastructure'), the Statement is a material consideration in the determination of this planning application as the proposed measures to increase Luton Airport's passenger throughput.
- 10.3.21 The Government's current position with regard to the UK's international obligations in respect of aviation emissions is set out in the DTP. Following the publication of the Aviation 2050 green paper in December 2018, the Government is currently preparing its Aviation Strategy to support the industry in delivering improvements for passengers and the environment. The Strategy (see below) will be aimed at achieving a safe, secure, and sustainable aviation sector that meets the needs of consumers at a global level.

Beyond the Horizon – the future of UK aviation: Making best use of existing runways

- 10.3.22 The Airport Commission's Final Report²¹⁹ recognised the need for an additional runway in the South East by 2030, but it also noted that there would be a need for other airports to make more intensive use of their existing infrastructure.
- 10.3.23 On 24th October 2017, the Department for Transport (DfT) released its latest aviation forecasts. These are the first since 2013. The updated forecasts reflect the accelerated growth experienced in recent years, and that demand was 9% higher in London in 2016 than the Airports Commission Forecast. This has put pressure on existing infrastructure by airports over the past decade, and highlights that the government has a clear issue to address.
- 10.3.24 The Aviation Strategy calls for evidence set out that government agrees with the Airport Commission's recommendation and was minded to be supportive of all airports who wish to make best use of their existing runways, including those in the South East, subject to environmental issues being addressed.
- 10.3.25 The consultation document "*The future of UK aviation: making best use of existing runways*"²²⁰ sets out that airport expansions under 10 million passengers per annum (mppa) should be considered at a Local Planning Authority level and take into account that the overall approach to reducing aviation GHG emissions from the UK is a matter to be tackled at a national level through the

²¹⁸ Department for Transport (2018). Aviation National Policy Statement. [online]. Available [online] at: <https://www.gov.uk/government/publications/airports-national-policy-statement> [Accessed 23 November 2020].

²¹⁹ The Airports Commission: Airports Commission: Final Report (2015). Available [online] at: <https://www.gov.uk/government/publications/airports-commission-final-report> [Accessed 23 November 2020].

²²⁰ HM Government (2018). Beyond the horizon: The future of UK aviation. Making best use of existing runways. [online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/714069/making-best-use-of-existing-runways.pdf [Accessed 21 October 2020].

forthcoming Aviation Strategy²¹⁸ which will be considered as part of the Net Zero Aviation Consultation due in Autumn 2020.

Aviation Policy Framework

- 10.3.26 The Aviation Policy Framework (APF)²²¹ was published in March 2013 and fully replaced the 2003 Air Transport White Paper as Government policy on aviation. The framework outlines objectives and principles to guide plans and decisions on airport developments, bringing together many related and discreet policies, some of which are 'in train' – for example, the work being carried out to deliver the ANPS²¹⁸. By defining the Government's objectives and policies on the impacts of aviation, the APF sets out the framework within which decisions on aviation ought to be made to deliver a balanced approach to securing the benefits of aviation and to support economic growth.
- 10.3.27 The APF states that the *"Government wants to see the best use of existing airport capacity"* and that in the short-term, a key priority for Government is to continue to work with the aviation industry and other stakeholders to make better use of existing runways at all UK airports to improve performance, resilience, and the passenger experience.
- 10.3.28 In Section 5 (planning) the APF sets out that all proposals for airport development must be accompanied by clear surface access proposals which demonstrate how the airport will ensure easy and reliable access for passengers, increase the use of public transport by passengers to access the airport, and minimise congestion and other local impacts.

Development Plan policies

Luton Borough Council's Climate Action Plan Support

- 10.3.29 This LBC Climate Action Plan Support document²²² was published in January 2020 and aims to provide an evidence base to inform the Council's Climate Action Plan. Its objectives are:
- to better understand:
 - ▶ the borough's carbon footprint using a location-based accounting approach;
 - ▶ use this information to determine the proportion of emissions that can be influenced locally without the action of regional or national actors; and
 - ▶ gaps in data where further work is needed.
 - to aid LBC in the following areas:
 - ▶ providing a more informed evidence base for future action plan development which also serves to inform and direct existing local projects; and
 - ▶ to encourage confidence in the mandate for climate action, thus facilitating the establishment of a robust local strategy which can deliver objectives over a long term cycle.
- 10.3.30 Section 6 of this document addresses the London Luton Airport Emissions, which represent a significant proportion of the borough's overall emissions. The document states:

²²¹ Department for Transport (2013). Aviation Policy Framework. Available [online] at: <https://www.gov.uk/government/publications/aviation-policy-framework> [Accessed 23 November 2020].

²²² Luton Borough Council/Anthesis (2020). Climate Action Plan Support. Available [online] at https://www.anthesisgroup.com/wp-content/uploads/2020/03/Luton-Climate-Action-Plan-Support_FINAL_v2.pdf [Accessed 23 November 2020].

"it will be vital for the council to work closely with the airport and associated businesses to manage and reduce the environmental impacts of the airport's operations, passenger activity and flights."

10.3.31

The document, in chapter 6, sets out the following recommendations regarding emissions:

- ▶ *"Emissions from flights are a significant source of emissions, and if aviation emissions continue to increase as currently modelled by National Government, the airline sector will reduce the available carbon budget for Luton borough (assuming aircraft technology and efficiency remains at today's levels). As mentioned in the previous sections of this report, this finite budget is already diminishing and will require significant investment and action from all stakeholders to keep within.*
- ▶ *The majority of flights taken from Luton Airport are for leisure rather than business, suggesting that the council could look at engaging with leisure travel passengers to consider alternative low carbon options. The Citizen's Assembly could provide a good forum for engagement with the public on this topic to help highlight the impact of aviation.*
- ▶ *There is a significant contribution to emissions as a result of transport to and from the airport. This will be a key opportunity for Luton Borough Council to influence activities of Luton Airport passengers. It is anticipated that the opening of the Luton Direct Air Rail Transit (DART) will help to reduce the number of passengers arriving and leaving the airport by private vehicle, however a strong community engagement plan will be needed to support this to encourage more uptake of public transport by airport staff and passengers.*
- ▶ *67% of Luton Airport passengers arrive at the airport in private vehicles. In order to reduce emissions from surface transport, it will be imperative that passengers have access to affordable, regular public transport options to shift away from current high levels of private vehicle use. Infrastructure capacity improvements to support the growth in electric vehicles will also be a key enabler for emissions reduction.*
- ▶ *Less than 2% (approx.) of Luton Airport passengers surveyed by the Civil Aviation Authority (CAA) in 2018 were Luton borough residents, demonstrating that the boundary of emissions associated with the airport stretches beyond the borough boundaries.*
- ▶ *Luton Airport and several of the key airline companies situated in Luton are engaged through the Sustainable Aviation membership network to apply a framework for managing air quality, emissions, noise and clean technology in the aviation industry. This collaboration platform will be critical in ensuring the operations and activities of the associated businesses are considered in alignment and all stakeholders are involved in the commitment to reduce their impacts.*
- ▶ *Luton Borough Council has the ability to use its powers to convene key aviation businesses in the Luton area to encourage shared learning.*
- ▶ *Luton Airport reports that emissions from the airport's operations have decreased by 40% since 2015 as a result of efficiency measures put in place. There is scope to continue these reductions.*
- ▶ *Luton Airport participates in the Airport Carbon Accreditation Programme and has achieved the Mapping accreditation for measuring and reporting on their direct and indirect emissions. The next steps for the scheme are to provide evidence of carbon management and reduction measures, measure third party emissions and aim for carbon neutrality by offsetting the remaining direct and indirect emissions."*

Luton Local Plan: 2011 - 2031

- 10.3.32 The Luton Local Plan 2011 – 2031²²³ was published in November 2017 and sets out policies, development allocations and actions for the area up to 2031. The LLP went through a public consultation between July 2016 and January 2017 to ensure the document suitably addressed issues on economic growth, social needs and environmental impacts.
- 10.3.33 The LLP sets out a series of 11 Strategic Objectives. Most notably, within the context of this development:
- "To retain and enhance Luton's important sub-regional role as a place for economic growth and opportunity including the safeguarding of London Luton Airport's existing operations and to support its sustainable growth over the Plan period based on its strategic importance."*
- 10.3.34 As part of the spatial strategy, policy LLP6 sets out the London Luton Airport Strategic Allocation. This gives policy and guidance on airport safeguarding, airport expansion, airport-related car parking, and design and drainage.
- 10.3.35 As part of the sustainable transport strategy, policy LLP31 integrates the Luton Local Transport Plan 2011 – 2026 which aims to *"ensure that an integrated, safe, accessible, and more sustainable transport system supports the economic regeneration and prosperity of the town."*

Luton Local Transport Plan 3: 2011 – 2026

- 10.3.36 The Luton Local Transport Plan 3 (2011 – 2026)²²⁴ was produced in March 2011 and states the following:
- "Our new transport strategy will help us to address local priorities, such as helping to improve the economic, social and environmental well-being of the local community and helping to improve health and reduce inequalities. It updates the policies contained within the Luton, Dunstable and Houghton Regis Local Transport Plan 2006 - 2011 published jointly by the Borough Council and the then Bedfordshire County Council and South Bedfordshire District Council, which were respectively the highway and planning authorities for Dunstable and Houghton Regis."*
- Government guidance recommends that Local Transport Plans demonstrate the relationship with the wider local policy context, in particular spatial planning elements defined through the LDF and those wider community aspirations detailed within the Sustainable Community Strategy.*
- Luton's LTP3 has been influenced by these wider local priorities and will show how transport will play a role in their achievement. In particular, transport can:*
- ▶ *Support economic growth by improving transport connections and journey reliability, making Luton more attractive for businesses*
 - ▶ *Protect the environment by promoting less environmentally damaging ways of travelling*
 - ▶ *Help make communities safer by reducing the number and severity of road traffic casualties*
 - ▶ *Promote health by enabling people to walk or cycle more, and by reducing air pollution*

²²³ Luton Borough Council. (2017). Luton Local Plan (2011 – 2031). Available [online] at: <https://www.luton.gov.uk/Environment/Lists/LutonDocuments/PDF/Local%20Plan/adoption/Luton-Local-Plan-2011-2031-November-2017.pdf> [Accessed 23 November 2020].

²²⁴ Luton Borough Council (2011). Luton Local Transport Plan 3: 2011 – 2026. Available [online] at: https://m.luton.gov.uk/Page/Show/Transport_and_streets/Transport_planning/Local%20transport%20plan/Pages/Local%20Transport%20Plan%203%202011-2026.aspx?redirectToMobile=True [Accessed 23 November 2020].

- *Support vulnerable people and reduce inequalities by improving and ensuring equitable access to key services."*

Other Relevant Documents

London Luton Airport - Surface Access Strategy: 2018 – 2022

10.3.37 The first ASAS was published in 2000 and has since been amended and updated. The most recent revision covers 2018 – 2022²¹³. The purpose of the ASAS is:

"To efficiently manage surface access to and from the airport in order to help minimise adverse impacts on the local community and environment, to promote and encourage sustainable surface transport and to help improve access to and from the airport for passengers, employees and service providers."

10.3.38 The ASAS sets out an Action Plan which aims to reduce Single Occupancy Vehicle (SOV) car use through improvements to sustainable travel modes. The objectives on the Action Plan are:

- to promote and encourage sustainable transport options for employees and passengers; and
- to reduce the impact of surface access to the airport on the local community.

Central Bedfordshire Local - Local Transport Plan 3 2011 – 2026

10.3.39 The vision of the Central Bedfordshire Local Transport Plan 3 (LTP) for 2011 – 2026²²⁵ is to:

"Globally connected, delivering sustainable growth to ensure a green, prosperous and ambitious place for the benefit of all by creating an integrated transport system that is safe, sustainable and accessible."

10.3.40 The LTP identifies 'areas of intervention' that the local authority will seek to deliver. These areas are small-scale schemes with relatively easy implementation plans. Areas include:

- land use planning e.g. embedded sustainable transport provision;
- smarter choices e.g. integrated electronic ticketing;
- infrastructure and service provision e.g. pedestrian and bus stop improvements;
- network management e.g. signage, ITS; and
- demand management e.g. park and ride, freight terminals.

10.3.41 The LTP also addresses major schemes that are to be delivered as part of the Core Strategy. One of the relevant schemes is the M1 Junction 10A improvements which aims to:

"Construct a grade separated junction at M1 Junction 10A will improve access to Luton, Luton London Airport and surrounding villages, it is being promoted jointly by Luton Borough Council (LBC) and Central Bedfordshire Council with LBC as lead authority."

²²⁵ Central Bedfordshire Council (2011). Local Transport Plan 3. Available [online] at: https://www.centralbedfordshire.gov.uk/info/55/transport_roads_and_parking/596/transport_strategy [Accessed 23 November 2020].

Hertfordshire Local Transport Plan 4: 2018 – 2031

- 10.3.42 The Hertfordshire Local Transport Plan 4²²⁶ for 2018 – 2031 was published last year and sets out Hertfordshire's future vision for the county up until 2031.
- 10.3.43 The Hertfordshire Local Transport Plan 4 highlights a transition away from car-based investment and capacity optimisation due to financial, environmental, and societal costs. It also highlights a strong move towards technology focused travel, specifically focusing on the challenges and opportunities technological development can play in the future of transport planning.
- 10.3.44 The LTP aims to deliver *"nine transport objectives which contribute strongly to the Place, Prosperity and People."* These objectives subsequently relate to a series of more specific policies and schemes.
- 10.3.45 Within the context of this transport assessment, policy 11 addresses access to airports as follows:
- "The county council, working in partnership with neighbouring local authorities and airport operators, will seek improvements to surface access to Luton and Stansted Airports, and promote and where possible facilitate a modal shift of both airport passengers and employees towards sustainable modes of transport."*
- 10.3.46 Specifically, in relation Luton Airport, it states:
- "The county council will work with relevant stakeholders as part of the Thameslink programme. This is a key element of plans to increase rail travel to London Luton Airport from Hertfordshire and beyond, in conjunction with the airport light rail link proposal. This includes lobbying for longer trains on the Midland Main Line and more frequent, faster services to Luton Airport Parkway, as well as improved and easier ticketing arrangements."*

10.4 Data gathering methodology

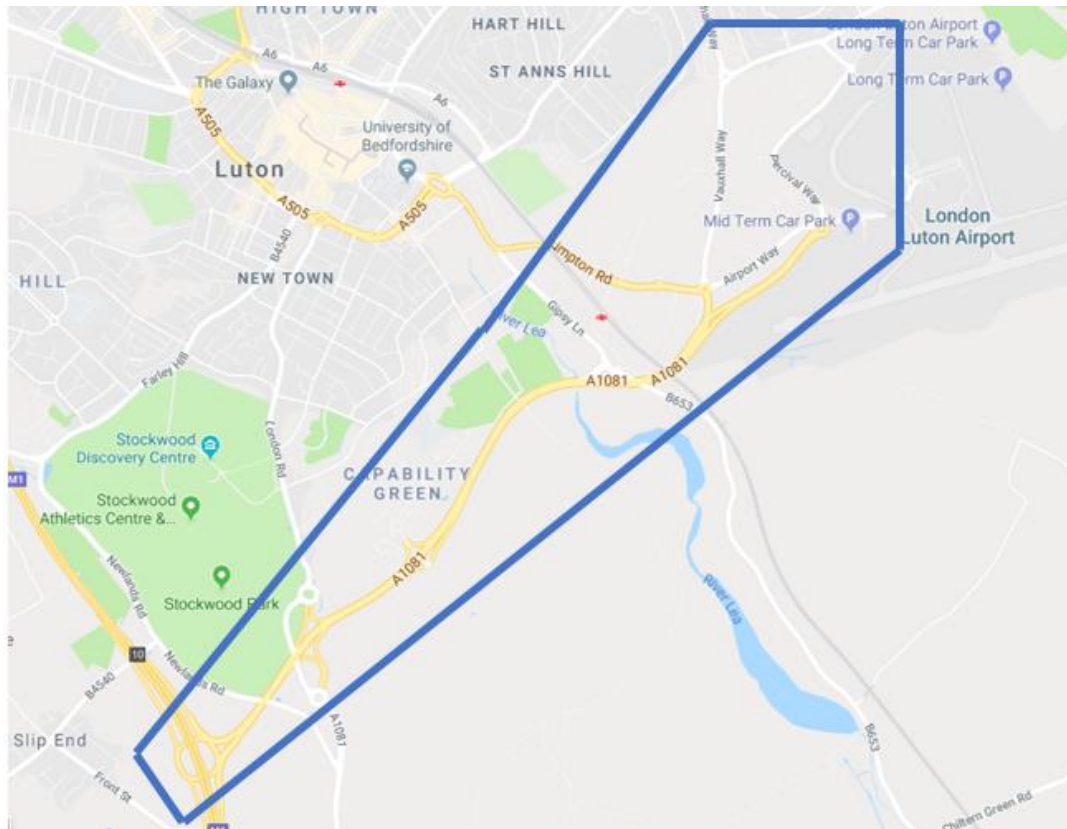
- 10.4.1 The baseline data for the passenger and staff demand analysis, included in the TA, was provided by York Aviation, and consisted of near actual 2019 18 mppa, and forecast 19 mppa aircraft schedules. This data was then combined with modal splits obtained from CAA related passenger data and a Staff Travel Survey conducted by Systra on behalf of LLAOL in 2019. 18 mppa (2019) and 19 mppa (2024) scenarios were produced by ARUP, allowing this assessment to compare and determine whether the increase in traffic volumes resulting from the increase in passenger numbers was significant.
- 10.4.2 Targets and the Action Plan, included in the TP, were obtained from the existing ASAS²¹³ and were reviewed against the 2019 passenger data and 2019 LLA Staff Travel Survey.
- 10.4.3 Information included in the CPMP of existing available parking was obtained from LLA as well as the ASAS.

Study area

- 10.4.4 A plan showing the extent of the highways impacts study area is shown in **Figure 10.1**. This has been agreed with LBC and Highways England.

²²⁶ Hertfordshire County Council (2018). Hertfordshire's Local Transport Plan 2018 – 2031. Available [online] at: <https://www.hertfordshire.gov.uk/media-library/documents/about-the-council/consultations/lt4-local-transport-plan-4-complete.pdf> [Accessed 23 November 2020].

Figure 10.1 Study area



- 10.4.5 Access into the Site by road can be gained via Airport Way and Airport Approach Road. These roads pass by the Short-Term Car Park, Mid-Term Car Parks, Holiday Inn, the Ibis, and directly into the Central Terminal Area which has associated public transport facilities, drop-off/pick-up zones, taxi bays, and Priority Parking.

Desk study

- 10.4.6 A summary of the organisations that have supplied data, together with the nature of that data is as follows:

- Luton Airport:
 - ▶ targets and action plan for 2022 in ASAS; and
 - ▶ available car park information.
- York Aviation:
 - ▶ 2019 actual passenger data; and
 - ▶ 2024 passenger and staff forecast data.
- Civil Aviation Authority (CAA):
 - ▶ 2019 passenger modal share data.
- Systra:
 - ▶ 2019 staff modal share data.

Survey work

- 10.4.7 No survey work was carried out for the transport analysis as all information had already been recorded and collected in 2019 by various organisations, as explained in the previous section.

10.5 Overall baseline

Current baseline

- 10.5.1 Based on information published in the 2019 CAA data, between 2015 and 2019 Luton Airport saw the highest growth in annual aircraft movements against other major London Airports (Gatwick, Heathrow, London City, and Stansted). Total annual passengers increased from 12.3 mppa in 2015 to 18.2 mppa in 2019, an increase of 49%.
- 10.5.2 According to the 2019 CAA data, 39.8% of passengers used private cars/rental cars as their main travel mode to the Airport, whilst 16.4% used taxi/minibus, 22.3% used bus/coach, 21.2% used rail, and 0.1% used the Tube/Metro/Subway or Tram.
- 10.5.3 A Staff Travel Survey (STS) was conducted by Systra on behalf of LLAOL in 2019. The survey gathered 781 responses from the approximate 8,400 employees at the time; a 9.3% response rate. The survey was conducted between January and February 2019. The survey showed that 59.4% of staff drive alone as their main form of transport to work, followed by 23.6% by public transport, 7.9% by multi-occupancy car trips, and 7.5% by active modes such as walking and cycling.
- 10.5.4 The latest targets set in the ASAS show that the airport has already met its key primary sustainable transport targets that were originally set for 2022 in 2019, 3 years ahead of schedule.
- 10.5.5 Currently there are 8,516 spaces of parking available, which is deemed appropriate for the existing traffic volumes.
- 10.5.6 A detailed review of the overall baseline can be found in the Transport Assessment submitted with this application. The following chapters of the Transport Assessment are most relevant:
- Chapter 4. Existing Sustainable Transport Network;
 - Chapter 5. Road Access and Car Parking Facilities;
 - Chapter 6. Existing Road Demand; and
 - Chapter 9. 2019 Airport Travel Demand.

Future baseline

- 10.5.7 Current forecasts indicate that passenger demand will reach 19 mppa in 2024, taking into consideration the impact of COVID-19 on passenger demand (see **Section 2.2**).
- 10.5.8 Current and forecasted passenger and staff numbers were provided to ARUP by York Aviation, who then carried out actual flow comparison by generating flows for 18 mppa (2019) and 19 mppa (2024) to establish increases in flow between 18 mppa actual and 19 mppa forecast.
- 10.5.9 A detailed review of the future baseline is set out in the Transport Assessment, Chapter 10 2024 Future Airport Travel Demand.

10.6 Consultation

- 10.6.1 The scope of the analysis and all related documents (TA, TP, and CPMP) was consulted and agreed by LBC and Highways England.
- 10.6.2 LLA was consulted in the review of the targets set in the ASAS and the updated targets set for 2024 resulting from the estimated forecasts for a 19 mppa scenario. The term 'target' is used in the sense of a statement that contains a measurement of the Travel Plan objectives and is a measure of outcomes achieved by the Travel Plan. The targets were set based on a review of the pre-existing targets set out for 2016, 2019 and 2022, as well as actual target results for staff and passengers in 2016 and 2019.
- 10.6.3 **Table 10.1** provides an overview of transport issues that were raised during the non-statutory consultation, identifies how the EIA has had regard to those issues, and where further information can be found in this chapter.

Table 10.1 Summary of issues raised during non-statutory consultation regarding transport

Issue raised	Consultee(s)	Response and how considered in this chapter	Section Ref
A number of respondents shared comments about the environmental effects and impacts of the Proposed Scheme on local road and rail transport networks, overcrowding and traffic congestion.	Various	This transport assessment has identified the likely significant effects arising from the proposed increase of the passenger throughput cap to 19 mppa. It is the operational changes arising from this condition that generate the additional surface access movements from a variety of transport modes. It also demonstrates how the existing transport infrastructure would be able to deal with the additional passenger numbers. Additional information is presented in both the Travel Plan, and Transport Assessment which accompany the Section 73 Application.	Section 10.9

10.7 Scope of the assessment

Spatial scope

- 10.7.1 The spatial scope of the assessment of the effects on the transport network covers the area shown in **Figure 10.1**. More specifically it varied depending on the mode of transport as explained in the following paragraphs.
- 10.7.2 With regards to the highway network spatial scope, Luton Airport has good connections to the existing strategic network. The A505 connects the Central Terminal Area (CTA) with the A1081, which provides a direct route to the M1 Junction 10 to the south-west, approximately 4 km from the Site. The A505 additionally extends to the east and into Luton Town Centre and beyond to the M1 Junction 11.
- 10.7.3 The rail network spatial scope focused on the nearest railway station to the airport, Luton Airport Parkway Railway Station, situated 1.6 km to the south-west of the Site.
- 10.7.4 The bus/coach network spatial scope focused on both Luton Airport and Luton Airport Parkway Bus Station. All services provided to both areas were included in the transport analysis.
- 10.7.5 Even though cycle use by passengers to the airport is not usually feasible, it was identified as a viable option for staff residing in nearby areas or as part of a multi-modal journey. As such, the cycle network spatial scope includes the following infrastructure:

- located the south-west of the Site, National Cycle Route 6 (NCR6) runs off-road adjacent to Lower Harpenden Road, under the A1081, across the B653 Gipsy Lane, and adjacent to the A1081, before routing on-road along Park Street;
- on approach and exit to the Luton Parkway Rail Station, advisory on-road cycle lanes with contract surfacing are provided which connect between the rail station cycle parking and the B653 including NCR6;
- at a local level, NCR6 routes into Central Luton, Limbury, Marsh Farm, and Houghton Regis to the north, and Harpenden to the south;
- at a strategic level, the NCR6 provides a cycle connection between, Leicester, Northampton, Milton Keynes, Luton, St Albans, and Watford; and
- additional to national cycle routes, localised cycle provisions can be found along Airport Way between Holiday Inn and the A1081/A505/Percival Way roundabout in the form of a shared foot/cycleway with associated signage and road markings. On-road mandatory cycle lanes are also provided along the A1081 between the A1018/A505/Vauxhall Way roundabout and Capability Green Business Park.

Temporal scope

- 10.7.6 The temporal scope of the assessment of effects on the transport network looks at the comparison between a base year 2019 (18 mppa) and the future forecast year 2024 (19 mppa).

Potential receptors

- 10.7.7 Potential receptors to be affected by the increase in passenger numbers were identified by reviewing the base year and future scenarios' network performance, including all relevant modes (car, rail, bus/coach, cycling); additionally, the available existing parking facilities were assessed against the expected increase in demand.
- 10.7.8 A review of the existing ASAS and its relevant targets and action plan was used to identify the targets that had already been achieved and needed revising according to the 2024 forecasts.

Likely significant effects

- 10.7.9 The transport network receptors that have been taken forward for assessment are summarised as follows:
- increase in private car traffic demand;
 - increase in public transport demand;
 - increase in car parking demand; and
 - 2022 ASAS targets and action plan.

10.8 Assessment methodology

- 10.8.1 The generic project-wide approach to the assessment methodology is set out in **Chapter 4: Approach to preparing the Environmental Assessment**, and specifically in **Sections 4.5 to 4.7**. However, whilst this has informed the approach that has been used in this transport network assessment, it is necessary to set out how this methodology has been applied and adapted as appropriate.

- 10.8.2 The TA consists of a detailed analysis of passenger and staff numbers at 18 mppa (2019) and 19 mppa (2024), both based on actual 2019 data and forecast data. The data was then combined with mode share data extracted from 2019 CAA Passenger Data and a Staff survey to estimate traffic flows and determine the impact of increasing passenger numbers.
- 10.8.3 The TP was developed by comparing the targets and action plan set out in the latest ASAS against the estimated transport demand for 19 mppa. The analysis performed for this document was translated into new objectives for 2024, and an action plan focused on encouraging the use of public transport and reducing the use of private vehicles, which will be monitored periodically.
- 10.8.4 The CPMP sets out in detail the available parking facilities at LLA, and how pricing and management will be monitored to cope with the increase to 19 mppa, while contributing further to the targets set out in the TP to reduce car use and encourage the use of public transport.

10.9 Assessment of future traffic demand effects

Baseline conditions

Current baseline

- 10.9.1 Current forecasts indicate that passenger demand reached close to 18 mppa in October 2019. LLAOL wish to raise the passenger cap from 18 mppa to 19 mppa to ensure that the airport can continue to grow in the short- to medium-term, with 19 mppa now expected to be reached in 2024.
- 10.9.2 The 2019 airport related traffic flows (staff and passengers) were estimated by ARUP based on near actual 18 mppa aircraft schedules supplied by York Aviation. The October day applied in the assessment is a typical weekday average of aircraft movements, avoiding half terms and weekends when background road traffic could be expected to be lower. The average load factor on individual aircraft is 90%, this is similar to the summer peak to ensure any individual peaks and troughs in the day are not underestimated. A summary of the 2019 passenger and staff traffic flow is shown in **Table 10.2**.

Table 10.2 2019 airport related traffic flows

Inbound / Outbound Flow	October 2019 AM flows (18 mppa)	October 2019 PM flows (18 mppa)
Passenger bus/ coach	140	140
Passenger minicab	466	405
Passenger cars	1,264	1,097
Staff	1,355	1,246
Total	3,225	2,888

- 10.9.3 The airport has already met the key surface access targets on sustainable transport for 2022 stated in the ASAS for both staff and passengers. Therefore, more ambitious targets have been set in agreement with the airport in the TP that accompanies this Section 73 application.
- 10.9.4 The existing car parking facilities at the airport have been deemed appropriate by LBC for the 18 mppa scenario.

Predicted future baseline

- 10.9.5 Currently, the COVID-19 pandemic has brought many uncertainties with regards to passenger forecasts. The airport expects passenger volumes to return to 2019 levels (18 mppa) by 2023 in a medium recovery scenario, according to a recent analysis testing several scenarios of low, medium, and high recoveries. The analysis included an assumption of passenger increase to 19 mppa by 2024 and concluded, based on industry insight, that LLA could realistically be back at 18 mppa sometime in 2023 and be growing beyond 18 mppa in 2024 (see **Section 2.2**).
- 10.9.6 The introduction of the Direct Air-Rail Transit (DART) in 2021, which was not accounted for in the future forecast, is likely to cause a reduction in the number of staff and passengers using private car mode of travel.
- 10.9.7 It should also be noted that CAA data shows a continuous increase in public transport modal share, and, as such, the volumes of car borne traffic are likely to be significantly less going forward. This is further made likely by the introduction of DART, which is expected to come into operation in 2021. The likely positive impact of the introduction of DART on further mode shift to public transport was not allowed for in the future baseline forecast and as such the assessment presented here is a robust pessimistic 'worst case' scenario.
- 10.9.8 As detailed in the Car Parking Management Plan included in the Transport Assessment, the airport's official car parks collectively have capacity for just under 10,000 car spaces which is a limited number compared to the daily passenger population at the airport. The limited car parking capacity naturally encourages passengers to travel by public transport. The car parks are priced to encourage passengers to travel by public transport. The financially competitive and convenient access by train (especially for advanced tickets) and bus would far outweigh the cost of travelling by car and the associated running and parking costs for many passengers, particularly in the context of the limited capacity at the airport. Therefore, it is expected that the airport's existing car parking facilities will be sufficient for a 19 mppa scenario in combination with controlled capacity and pricing, monitored through the ASAS and latest TP accompanying this Section 73 application.

Predicted effects and their significance

- 10.9.9 The forecast 2024 traffic volumes resulting from the increase in passenger numbers were estimated based on actual (2019) and forecast (2024) aircraft schedules. These estimates show a worse-case minor increase in traffic flows of 3.7% in the AM peak and 3.2% in PM peak between the 2019 18 mppa and 2024 19 mppa scenarios. Based on our assessment of the network and discussions held with Highways England and LBC, it was established that this level of flow increase is unlikely to have a significant impact on the operation of the network and as such does not warrant any further detailed transport modelling analysis at this stage.
- 10.9.10 A comparison of the 2019 18 mppa flows and estimated 2024 airport related traffic flows is shown in **Table 10.3** and **Table 10.4**.

Table 10.3 Comparison of 2019 18 mppa and 2024 19 mppa forecast airport related flows for AM Peak

Inbound / Outbound Flow	2019 AM flows (18 mppa)	2024 AM flows (19 mppa)	Difference 18 mppa / 19 mppa
Passenger bus / coach	140	146	6
Passenger minicab	466	487	21
Passenger cars	1,264	1,319	55
Staff	1,355	1,393	38

Total	3,225	3,345	121
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Table 10.4 Comparison of 2019 18 mppa and 2024 19 mppa forecast airport related flows for PM Peak

Inbound / Outbound Flow	2019 PM flows (18 mppa)	2024 PM flows (19 mppa)	Difference 18 mppa / 19 mppa
Passenger bus / coach	140	146	6
Passenger minicab	405	418	13
Passenger cars	1,097	1,134	37
Staff	1,246	1,281	35
Total	2,888	2,979	93

10.9.11 It should be noted that the forecast traffic flows presented above did not account for the impact of the Travel Plan targets set out for up to 2024 forecast year. These targets were set out based on the latest statistics which show a significant reduction in private vehicle and Single Occupancy (SOV) travel by both passengers and staff and a shift to sustainable modes. It is extremely encouraging that the airport has already met its key primary sustainable transport targets that were originally set for 2022 in 2019, 3 years ahead of schedule. As such the latest results have been used to set new stretching targets and objectives focusing around three key areas: reduction in private car travel, increase in sustainable travel and a focus on reducing carbon emissions derived from surface access to the airport.

10.9.12 A summary of all set targets for 2024 and how they compare with previous targets is shown in **Table 10.5**.

Table 10.5 Summary of 2024 Targets

Target	Target 2019 (%)	Performance 2019 (%)	Target 2022 (%)	Target 2024 (%)	Impact
Reduce employee single-occupancy, non-electric private car travel	66	59	64	56	2019 Target met with an additional reduction of 7%, a further reduction of 3% is expected by 2024.
Reduce passenger single-occupancy, non-electric private car travel	49	40	43	40	2019 target met with a reduction of 9%. A target of retaining the achieved 40% by 2024 has been set. Impacts of DART are expected to come from taxis, thus, are excluded from this target.
Increase employee travel by sustainable modes of transport	26	31	28	33	2019 target met with an additional increase of 5%, a further 2% increase has been set as a 2024 target.

Target	Target 2019 (%)	Performance 2019 (%)	Target 2022 (%)	Target 2024 (%)	Impact
Increase passenger travel by sustainable modes of transport	34	43	36	47	2019 target met with an additional increase of 9%, a further increase of 4% has been set as a 2024 target.
Increase employee travel by bus and coach	N/A	16	11	17	An increase of 1% on the target achieved in 2019 has been set as a target for 2024.
Increase passenger travel by bus and coach	N/A	22	17	22	A target of retaining the target achieved in 2019 has been set for 2024.
Increase employee travel by rail	N/A	8	9	10	An increase of 2% on the target achieved in 2019 has been set as a target for 2024.
Increase passenger travel by rail	N/A	21	24	25	An increase of 4% on the target achieved in 2019 has been set as a target for 2024.
Increase awareness of Cycle-to-Work scheme	N/A	46	80	80	A target of achieving an 80% of staff awareness of the scheme has been set for 2024.
Increase employee travel by cycle	N/A	1.7	N/A	3	A target of achieving an increase up to 3% of staff travelling by cycle has been set for 2024.
Increasing Car Sharing Awareness	N/A	22	50	50	A target of achieving a 50% of staff awareness of the scheme has been set for 2024.
Secure 12% participation in the staff travel survey	12	12	12	12	A target of retaining the target achieved in 2019 has been set for 2024.
Increase the number of organisations attending the Airport Travel Forum	10	10	12	15	An increase of 5 additional organisations has been set for 2024.
Deliver at least 2 promotional travel events per year	2	2	2	4	An increase to 1 event per quarter, for a total of 4 events per year, has been set for 2024.

Target	Target 2019 (%)	Performance 2019 (%)	Target 2022 (%)	Target 2024 (%)	Impact
Increase in awareness of Staff Travelcard	60	60	65	65	An increase of 5% on the target achieved in 2019 has been set as a target for 2024.

- 10.9.13 A detailed analysis of the proposed measures for achieving the above presented targets is included in the Travel Plan document. LLAOL's Travel Plan Co-ordinator (under the Surface Access team) will manage the delivery of the Travel Plan. Their role will be to develop the Travel Plan measures and identify a more detailed implementation programme. The Travel Plan Coordinator is expected to increase awareness of sustainable travel options such as car sharing, public transport or cycling and its associated benefits.
- 10.9.14 The Action Plan has been produced to summarise how the elements of the Travel Plan will be implemented and the responsible parties as shown in **Table 10.6**.

Table 10.6 Travel Plan measures

Measure	Timescale (Short/Med/Long)
W1: Encourage walking to work if the staff member lives within a 30-minute walking distance.	Short
W2: Ensure that high quality and appropriate way-finding is in place to guide pedestrians to transport links and key destinations. Ensure walkways are well-lit at night to ensure safe movement throughout the site.	Short
C1: Promote safe cycling, including sale of discounted locks and safety equipment (helmets and bike lights) through local bike shops for staff.	Short
C2: Promote the Cycle+ salary sacrifice scheme for staff (offering tax-free cycle purchases)	Short
C3: Provide an ongoing delivery of cycle events, initiatives, and training, and support national events where appropriate	Short
C4: Incorporate secure cycle parking facilities within the design of all buildings within the site. Ensure cycle storage facilities are well lit, secure and offer protection from the weather.	Medium
C5: Ensure adequate provision of shower and changing facilities for staff commuting by bicycle	Medium
C6: Quarterly cycle maintenance event for staff	Short
C7: Identifying suitable commuter cycling corridors and routes to be improved in order to encourage staff to cycle to work.	Medium
PT1: Continue to promote local bus and coach travel and build upon previous attempts to promote the Luton Dunstable Busway	Short
PT2: Continue to promote the Staff Discount Travel Card	Short
PT3: Ensure clear signage and wayfinding guides public transport users to nearby bus stops and rail services and that it is of a high standard.	Short
PT5: Ensuring the provision of live travel information and timetables for staff and passengers for bus stops and train times.	Short

Measure	Timescale (Short/Med/Long)
PT6: Explore procurement options for a change from diesel/petrol to electric/hybrid shuttle vehicles on-site	Medium
PT7: Promotion and marketing of DART upon launch	Short / Medium / Long
MV1: Provide and enforce Priority Parking areas for car-clubs and car-sharing opportunities	Short
MV2: Explore procurement options for a change from diesel/petrol to electric/hybrid service vehicles on-site	Medium
MV3: Introduce controls and enforcement to prevent vehicles from idling while delivering or visiting the site.	Short
MV4: Promote taxi or ride-sharing opportunities through the use of ride-share schemes, car clubs and app-based travel	Short
MV5: Personalised travel planning sessions for staff to explore sustainable travel options	Short
MV6: New starters travel information packs on sustainable travel options, discounts, and promotions	Short
MV7: Review current provision and potential installation of additional electric charging points for passengers.	Short
EV1: Monitor usage of existing charging points for electric vehicles (currently 10 charging points available)	Short
EV2: Promote the use of electric vehicle facilities	Short
EV3: Review the potential installation of additional electric vehicle charging points depending on increasing demand.	Short
EV4: The introduction of pricing incentives (such as the "electric vehicle drop-off tariff") for EVs where appropriate without compromising the uptake of public transport and active travel.	Short

- 10.9.15 A monitoring programme will be discussed and agreed between the Travel Plan coordinator and Luton Borough Council. Continuous monitoring of the Travel Plan will assess:
- Progress against the SMART targets of the Travel Plan;
 - The need for refinements to the Travel Plan; and
 - The effectiveness of the Travel Plan for encouraging sustainable travel.
- 10.9.16 In addition to formal monitoring, the Travel Plan coordinator will monitor the various Travel Plan measures, such as:
- Levels of bus patronage at bus stops in close proximity to the site access;
 - The use of specific schemes and measures including car sharing and cycle parking facilities; and
 - Levels of participation in travel plan coordinator-led promotional events.

10.10 Conclusions of significance evaluation

- 10.10.1 The estimated increase in passengers from 18 mppa to 19 mppa is likely to have a very minimal impact in traffic volumes and negligible significance. With less than 4% increase in both the AM and PM peaks, it has been established with the relevant authorities that no further detailed transport modelling is needed at this stage.
- 10.10.2 CAA data shows a continuous increase in public transport modal share, and, as such, the volumes of car borne traffic are likely to be significantly less going forward. This is further made likely by the introduction of the DART, which is expected to come into operation in 2021. This is likely to result in a higher volume of rail patronage than that adopted in this analysis.
- 10.10.3 Car parking facilities available to LLAOL, in combination with controlled capacity and pricing, to be monitored through the new targets and action plan established in the latest TP, are expected to be sufficient for 19 mppa in line with 2024 forecasts.

10.11 Assessment of cumulative effects

- 10.11.1 As outlined in **Section 4.8**, consideration has been given to whether any of the receptors that have been taken forward for assessment in this chapter would be likely to be subject to cumulative transport effects, as a result of transport effects generated by 'other developments'. The future baseline scenarios assessed within this transport assessment have therefore taken account of the growth in traffic that could arise from other developments.
- 10.11.2 The assessment of the potential traffic impacts on the local highway network (**Section 10.9**), and discussions held with Highways England and Luton Borough Council, have established that the level of flow increase is unlikely to have a significant impact on the operation of the network. **No likely significant inter-project effects** are therefore predicted to occur from the Proposed Scheme together with 'other developments'. Similarly, **no likely significant intra-project effects** are predicted to arise from cumulative transport interactions with the environmental aspects assessed within this ES. Therefore, **no likely significant cumulative transport effects are predicted to occur**.

10.12 Implementation of environmental measures

- 10.12.1 No specific environmental measures have been implemented as part of the transport network analysis. However, the airport has already achieved several of the targets set in the ASAS ahead of schedule and continues to push further with new targets for 2024. These measures will encourage passengers to use public transport as an alternative to private and single occupancy vehicles.

11. Summary of likely effects

11.1 Introduction

- 11.1.1 This ES has been prepared on behalf of LLOAL, in support of a Section 73 application to vary Condition 8 and Condition 10 of the 2014 Planning Permission. The proposed variations to Condition 8 and Condition 10 seek to, increase the permitted passenger throughput to 19 mppa, and to increase the existing noise contours.
- 11.1.2 This chapter summarises the likely effects which are reported in full in each of the individual topic chapters described below.
- 11.1.3 A detailed description of the proposed variation to Condition 8 is provided in **Chapter 3: Description of the Proposed Scheme**. However, in broad terms LLA has experienced rapid growth and has already reached the 18 mppa cap in 2019, nine years earlier than predicted. The proposed variation to Condition 8 has been sought to accommodate the expected growth in capacity by increasing passenger throughput from 18 mppa to 19 mppa.
- 11.1.4 A detailed description of the proposed variation to Condition 10 is also provided in **Chapter 3: Description of the Proposed Scheme**. Put briefly, the noise contours set out in the 2014 Planning Permission made assumptions regarding fleet modernisation of aircraft operation out of LLA which have not kept pace with passenger demand. Variation to Condition 10 is being sought to provide a less restrictive day and night noise contour than is currently set out for the period until 2027 and for 2028 onwards.
- 11.1.5 The scope of the EIA has been discussed with LBC and it is considered that all necessary environmental technical topics, from which a likely effect could occur, have been given due consideration.
- 11.1.6 A summary of the topic requirements of *2017 EIA Regulations*, and the chapters in which they are addressed, is included in **Table 1.2** within **Chapter 1: Introduction**. However, for comprehension within this summary, the environmental chapters or topics which are the subject of this EIA are as follows:
- **Chapter 6: Air quality;**
 - **Chapter 7: Climate;**
 - **Chapter 8: Noise;**
 - **Chapter 9: Health;** and
 - **Chapter 10: Transport.**
- 11.1.7 Each of the environmental topics above have been the subject of an assessment and include consideration of any necessary mitigation measures, and report on the likely significant effects following the implementation of such mitigation measures.

Overall summary of effects

- 11.1.8 A summary of the effects arising due to the proposed variations to Condition 8 and Condition 10, as assessed within this ES Addendum, is provided in **Table 11.1**.

Table 11.1 Summary of effects

Receptor and summary of predicted effects	Significance	Summary rationale
Air quality		
Human health effects: Annual mean NO ₂ , PM ₁₀ , and PM _{2.5}	Not significant	All impacts on human receptors are classified as negligible in terms of the IAQM/EPUK guidance.
Effect to Ecological receptors.	Not significant	All impacts on ecological receptors are classified as not significant under Environment Agency guidance.
Climate		
GHG emissions from the Proposed Scheme will have a low GHG emissions magnitude, and the overall effect of projected GHGs associated with the Proposed scheme on the global climate is considered minor adverse.	Not significant	<p>The emissions from the Proposed Scheme itself are only 0.05% - 0.06% of the planning assumption. Thus, the proposed Scheme will not materially affect the ability of the UK to meet the 37.5 MtCO₂/yr planning assumption. Therefore, the Proposed Scheme is very unlikely to materially affect the ability of the UK Government to meet the 37.5 MtCO₂/yr 'planning assumption' for UK international aviation GHG emissions in 2050, and its carbon targets for net zero in 2050, on the basis that a Carbon Reduction Plan is produced.</p> <p>The Proposed Scheme is also unlikely to materially affect the ability of Luton Borough Council to meet its aim to be a carbon neutral borough by 2040, also on the basis that a Carbon Reduction Plan is produced.</p> <p>Lastly the Proposed Scheme would be consistent with the National Planning Policy Framework (NPPF) requirement for developments to 'support the transition to a low carbon future in a changing climate', on the basis that a Carbon Reduction Plan is produced.</p>
Noise		
Residences: dwellings exposed to night-time noise above SOAEL	Significant Adverse	With the Proposed Scheme, residents in 1,877 dwellings would experience a night-time noise level above SOAEL (55 dB L _{Aeq} , 8 hour) 1 - 1.9 dB higher than existing Condition 10 limits allow.
Non-residential receptors: exposure to daytime and night-time noise levels	Significant Adverse	The assessment shows increases in noise level of at least 1 dB and above threshold effect criteria for non-residential receptors at Caddington (schools), Park Town (academy and nursery) in Luton, Breachwood Green (school), St Pauls Walden (church), Slip End (school), and Stevenage Station (college). These significant effects are mainly predicted in 2022, except for ongoing significant effects in Park Town, Luton to 2024 and at Slip End to 2023.
Health		

Receptor and summary of predicted effects	Significance	Summary rationale
2021 and 2022 18 mppa scenario compared with existing Condition 10 short term health effects		
Human: residents exposed to noise between 51 – 62 dB LA _{eq,16hr} (daytime) and 45-54 dB LA _{eq,8hr} (night-time).	Significant	The increase in noise exposure to a large number of people indoors and out outdoors will change the amenity value of public space having a low magnitude of change on children learning and on social capital through a small reduction in social interaction and helpful behaviours.
Human: residents exposed to noise between 63 - 68 dB LA _{eq} 16hr (daytime) 55 - 62 dB LA _{eq} 8hr (night-time)	Significant	As for residents above, the noise exposure has the potential to a number of residents. LLA will provide noise insulation to reduce noise exposure indoors though this insulation will not reduce the noise exposure indoors with windows open and noise exposure outdoors. The judgment on the magnitude of change takes account of the embedded proposed mitigation.
Workers and visitors exposed to between 51 - 62 dB LA _{eq} 16hr (daytime), noise between 45 - 54 dB LA _{eq} 8hr (night-time)	Not significant	The individual noise increase is small across the whole affected population, the change in magnitude is judged to be minor for workers and visitors because they have a specific reason to be in the area with immediate short-term benefits which make it easier for them to adapt to, or not discern, small increases in noise.
Noise-sensitive non-residential facilities (hospitals, nursing homes, schools)	Significant	Users of hospitals and nursing homes are highly sensitive to noise. Schools could experience a moderate change when taking account of children's activities outdoors in school playgrounds and playing fields.
Public open spaces and recreational green spaces	Potentially Significant	Public open spaces and recreational green spaces have a moderate to high sensitivity when taking into account children and older people and those with pre-existing health conditions and disabilities who may use these spaces.
2028 19 mppa scenario compared to 12.5 mppa revised baseline and future Condition 10 long term health effects		
Human: residents exposed to between 51 – 62 dB LA _{eq,16hr} (daytime) and 45-54 dB LA _{eq,8hr} (night-time).	Significant	The increase in noise exposure to a large number of people indoors and out outdoors will change the amenity value of public space having a minor magnitude of change on children learning and on social capital through a small reduction in social interaction and helpful behaviours.
Human: residents exposed to noise between 63 - 68 dB LA _{eq} 16hr (daytime) 55 - 62 dB LA _{eq} 8hr (night-time)	Significant	As for residents above, the noise exposure has the potential to a number of residents. LLA will provide noise insulation to reduce noise exposure indoors though this insulation will not reduce the noise exposure indoors with windows open and noise exposure outdoors. The judgment on the magnitude of change takes account of the embedded proposed mitigation.
Workers and visitors exposed to between 51 - 62 dB LA _{eq} 16hr	Not significant	The individual noise increase is small across the whole affected population, the change in magnitude is judged to be minor for

Receptor and summary of predicted effects	Significance	Summary rationale
(daytime), noise between 45 - 54 dB LAeq 8hr (night-time)		workers and visitors because they have a specific reason to be in the area with immediate short-term benefits which make it easier for them to adapt to, or not discern, small increases in noise.
Noise-sensitive non-residential facilities (hospitals, nursing homes, schools)	Not significant	Users of hospitals and nursing homes are highly sensitive to noise. Schools could experience a moderate change when taking account of children's activities outdoors in school playgrounds and playing fields.
Public open spaces and recreational green spaces	Potentially significant	Public open spaces and recreational green spaces have a moderate to high sensitivity when taking into account children and older people and those with pre-existing health conditions and disabilities who may use these spaces.
Transport		
Transport network	Not significant	No significant effects are anticipated with a less than 4% Increase in traffic movements at both AM and PM peak times and the introduction of the DART aiming to increase percentage of rail use to the airport.

Source: Wood Environment & Infrastructure Solutions UK Limited, 2020

