London Luton Airport

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London Luton Airport Operations Limited

Luton Airport Expansion - 19 mppa

Environmental Impact Assessment

Volume 2: Environmental Statement Addendum

JULY 2022

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Wood Group UK Limited – June 2022

Report for

Alejo Pérez Monsalvo
CAPEX Director
London Luton Airport
Percival House
Airport Way, Luton
Bedfordshire LU2 9NU

Main contributors

Alistair Billington
Mark Evans
Ben Warren
Matt Osund-Ireland
Monika Crouse

Issued by

Alistair Billington

.....

Alistair Billington – Technical Director

Approved by

Nick Hilton

.....

Nick Hilton - Director

Wood

3rd Floor
11 Westferry Circus
Canary Wharf
London E14 4HD
United Kingdom
Tel +44 (0)20 3215 1610

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Document revisions

No.	Details	Date
1	ES Addendum Volume 2	July 2022

wood.

Contents

1. Introduction

1.1 Background to ES Addendum

1.1.1 On 11 January 2021, London Luton Airport Operations Limited ('LLAOL') made an application pursuant to section 73 of the Town and Country Planning Act 1990 ('the 1990 Act') to Luton Borough Council ('LBC') for the following (the 'S73 Application').

Variation of Conditions 8 (passenger throughput cap), 10 (noise contours), 22 (car parking management), 24 (travel plan) and 28 (approved plans and documents) to Planning Permission 15/00950/VARCON (dated 13th October 2017) to accommodate 19 million passengers per annum and to amend the day and night noise contours.

1.1.2 The S73 Application seeks the variation of certain conditions attached to the existing planning permission for Luton Airport ('the Airport') dated 13 October 2017 with reference number 15/00950/VARCON ("the Variation Permission'). The Variation Planning permission dated 13 October 2017 is described as such as it was itself a variation of a planning permission granted in June 2014 for the expansion of the Airport involving, inter alia, the dualling of Airport Way, extensions to the terminal, a new pier and walkway, extensions to taxiways, enlargement of car parks and the construction of a multi-storey car park (ref: 12/01400/FUL) ("the 2014 Permission'). The 2014 Permission was the subject of its own Environmental Statement dated 2012 ('the 2012 ES').

1.1.3 The S73 Application does not propose any new or varied operational development.

1.1.4 After carefully scrutinising the S73 Application over the course of eleven months (including engaging independent expert consultants to conduct a detailed assessment of noise and climate change aspects of the S73 Application) officers at LBC recommended that planning permission should be granted for the Proposed Scheme. The scrutiny process generated a number of requests for clarification from LBC, including a formal request for further environmental information pursuant to regulation 25 of the Town and Country Planning (Environmental Impact Assessment) Regulations 2017, resulting in an additional consultation on that further environmental information.

1.1.5 After considering the S73 Application over two evenings on 30 November 2021 and 1 December 2021, the Development Management Committee of LBC agreed with officers, and resolved to grant planning permission for the Development, subject to the Applicant and LBC entering into a section 106 agreement to secure certain aspects of mitigation, including noise mitigation.

1.1.6 On 6 April 2022, the Secretary of State for Levelling Up, Housing and Communities called-in the Application for his own determination. On 11 May 2022, the Secretary of State for Transport made a direction under section 266(1A) of the Town and Country Planning Act 1990 for a joint determination of the Application.

1.1.7 This 2022 Environmental Statement Addendum ('2022 ESA') has been prepared to provide an update of the 2021 ES Addendum to the Secretaries of State in respect of their determination of the Application.

1.2 Purpose of this Document

1.2.1 Since the S73 Application was submitted in January 2021, the COVID-19 Pandemic has continued to have an effect on the Airport and the aviation sector generally. The original assessment years of 2021 and 2022 used in the 2021 ES Addendum that was submitted in support of the S73 Application have

now passed. Additionally, whilst 2024 was previously identified as the year when 19 mppa would be reached, this is now forecast to be 2025.

1.2.2 The 2021 ES Addendum submitted in support of the Application has therefore been reviewed in light of the use of updated key assessment years of 2023, and 2024, and with 19 mppa anticipated to be reached in 2025. Following this review this 2022 ES Addendum (this document and its accompanying volumes) has been prepared. This 2022 ES Addendum provides an update on any changes to the likely significant environmental effects of what is proposed as compared with the 2021 ES Addendum.

1.3 Summary of Proposed Scheme amendments

1.3.1 The proposed amendments under the S73 Application ('the Proposed Scheme') principally concern Condition 10 attached to the Variation Permission (15/00950/VARCON) and the Proposed Scheme seeks to vary the wording of Condition 10 in order to provide a less restrictive day and night noise contour. This adjustment is required for the Airport to reflect what has been a slower than anticipated introduction by airlines of the next generation of quieter aircraft. The modernisation of fleets by airlines has not kept pace with the unexpectedly steep rise in passenger demand over the same period.

1.3.2 Since the publication of the 2021 ES Addendum, the proposed variations to the wording of this condition (see **Section 2.2** of the 2021 ES Addendum), with respect to the size of the day and night-time noise contour for the period to the end of 2027 have been further revised in consequence of observations of Luton Borough Council and in light of that assessment years 2020, 2021, and 2022 have now passed. The aircraft movement and passenger forecasts have therefore been updated to reflect the revised key assessment years of 2023, 2024, and 2025.

1.4 Scope of this Environmental Statement Addendum

1.4.1 This 2022 ES Addendum has been prepared in order to identify any changes to the assessment and conclusions in the 2021 ES Addendum and, in particular to identify whether there are any additional, different, or new likely significant environmental effects arising from the Proposed Scheme. This 2022 ES Addendum has been prepared in accordance with the *Town and Country Planning (Environmental Impact Assessment) Regulations 2017* (the '2017 Regulations')[1].

1.4.2 The 2021 ES Addendum, and this 2022 ES Addendum, read together in light of the 2012 ES provide an up-to-date assessment of the likely significant environmental effects of the development originally consented by the 2014 Planning Permission and what is now proposed by way of variation to the 2017 Variation Permission under the Proposed Scheme. Where relevant, new matters required to be considered by the 2017 Regulations have been assessed.

1.5 Legislative and policy context

1.5.1 Where legislative and policy changes and updates have taken place since publication of the 2021 ES Addendum, these have been reported and taken account of in **Chapters 4 to 8**, which set out the updates to the technical assessments for the environmental topics.

[1] 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 23 June 2022].

1.6 The Applicant and the project team

1.6.1 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.

1.6.2 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.

1.7 Structure of this 2022 Environmental Statement Addendum

1.7.1 This 2022 ES Addendum 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** provides a description of the amendments to the Proposed Scheme made since the submission of the 2021 ES Addendum.
  - **Chapter 3** details the approach to the EIA that has been adopted in preparing this 2022 ES Addendum.
  - **Chapters 4 to 8** set out the updates to the technical assessments for the environmental topics made due to the passage of time since the submission of the 2021 ES Addendum.
- **Volume 3** contains the appendices and figures referred to in this 2022 ES Addendum.

1.7.2 A glossary of technical terms is provided in **Appendix 1A** in **Volume 3: Figures and Appendices** and list of abbreviations is provided in **Appendix 1B** in **Volume 3: Figures and Appendices**.

1.8 Access to the Environmental Statement

1.8.1 The ES with this addendum is available in electronic form via LBC's online planning portal and Luton Airport's Consultation website (http://www.luton19mppa.info/).

2. Description of the Proposed Scheme

2.1 Introduction

2.1.1 Since publication of the 2021 ES Addendum, there have been some changes to the description of the Proposed Scheme in respect of the proposed variation of the wording of Condition 10. The proposed changes are described in **Section 2.2** below. Updates have also been made to the forecast aircraft movements, as the impact of the COVID-19 pandemic has continued to affect airport operations during 2021, and 2022. The updates are presented in **Section 2.3** below.

2.2 Scheme description

Proposed Variation to Condition 10

2.2.1 The proposed variations to the wording of Condition 10, sought through the S73 application in January 2021, were set out in the 2021 ES Addendum. During its careful consideration of the S73 application, LBC proposed some further variations to the wording of Condition 10, which they reported in the amendment sheet to the Development Management Committee's Report (30 November 2021). LBC considered the wording should be altered from that proposed by the Applicant in 2021. This is because the size of the noise contours was based on the identified worst-case year of 2021, and the passage of time meant that it was more appropriate to reflect the slightly smaller area associated with the projected movements and contours for 2022. In summary, the formatting in the condition is as follows:

- Black text – original wording of the condition retained.
- ~~Strikethrough~~ - original wording deleted by Applicant.
- **Red text** – additional text sought by the Applicant.
- ~~**Strikethrough**~~ – wording deleted by LBC.
- **Blue text** – additional text sought by LBC.

"~~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~~** **21.1 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~~** **42.1 sq.km** for night-time noise, when calculated by the Federal Aviation 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.*

Post 31 December 2027 the area enclosed by the 57dB LAeq16hr (0700-2300hrs) contour shall not exceed 15.5 sq km for daytime noise, and the area enclosed by the 48dB LAeq(8hr) (2300-0700hrs) contour shall not exceed 35.5 sq km for night-time noise.

Post 31 December 2030 the area enclosed by the 57dB LAeq16hr (0700-2300) contour shall not exceed 15.1 sq km for daytime noise, and the area enclosed by the 48dB LAeq(8hr) (2300-0700hrs) contour shall not exceed 31.6 sq km for night-time noise.

A report on the actual and forecast aircraft movements and consequential noise contours (Day, Night and Quota Periods) for the preceding and 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."

2.3 Aircraft movements and passenger forecasts

Aircraft movement forecasts

2.3.1 **Table 2.1** below updates what was Table 3.2 in the 2021 ES Addendum to reflect the fact that assessment years 2020, 2021, and 2022 have all now passed. The table shows that to accommodate 19 mppa in 2025, the total peak day ATMs (483) would be consistent with the movements to accommodate both the 2019 18 mppa scenario and the 2024 18 mppa scenario. For the 2025 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, by 2028 the ATMs would then reduce by 6 movements (-1.24%), as compared with what is forecast for the 18 mppa scenarios, and the 2025 19 mppa scenario, as additional larger planes are introduced.

Table 2.1 Peak Day Air Transport Movements for key assessment years*

Peak day	18 mppa			19 mppa	
	2019 ATMs	2023 ATMs	2024 ATMs	2025 ATMs	2028 ATMs
Daytime	417	417	417	419	413
Night-time	66	66	66	64	64
Daily total	483	483	483	483	477

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

2.3.2 **Table 2.2** below provides an updated to what was Table 3.3 in the 2021 ES Addendum to reflect the fact that assessment years 2020, 2021, and 2022 have now passed. **Table 2.2** below shows that during the 92-day peak period, accommodating 19 mppa in 2025 would result in an increase of 228 (0.65%) daytime ATMs over the 92-day period as compared with what is forecast for the 18mppa scenario in the year 2024, with an increase in the night-time ATMs of 10 (0.2%) and an increase in the daily total of 338 (0.8%). There would, however, be a corresponding reduction in ATMs outside of the 92-day peak period. It is these 92-day peak period forecasts that define the noise contour for

each of the assessment years. These forecasts have therefore been used to underpin the assessments presented within this 2022 ESA.

Table 2.2 92-Day Peak Period Air Transport Movements for key assessment years*

92-day peak period	18 mppa			19 mppa	
	2019 ATMs	2023 ATMs	2024 ATMs	2025 ATMs	2028 ATMs
Daytime	34,124	34,708	35,003	35,331	34,849
Night-time	5,398	4,994	4,997	5,007	5,002
Daily total	39,522	39,708	40,000	40,338	39,851
% modernised fleet	6%	32%	41%	48%	88%

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

2.3.3 As shown in **Table 2.1** and **Table 2.2** above, ATMs would increase to accommodate additional passengers, but this would not be at the same rate of increase as for the passenger numbers. This is a consequence of increasing seat occupancy on aircraft, and larger seat numbers arising from the use of larger aircraft.

2.3.4 As reported in the 2021 ES Addendum, 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.

Fleet modernisation forecasts

2.3.5 The forecasts produced up to 2023 and used for the assessments in the 2021 ES Addendum have been updated. This is since the S73 application submitted in January 2021 remains undetermined, the passage of time means that 2021 and 2022 are no longer relevant assessment years. Therefore, the 2022 and 2023 forecasts presented in the 2021 ES Addendum, have been delayed by one year to 2023 and 2024 respectively, with the subsequent catch-up of forecasts to pre-COVID conditions completed by 2028.

2.3.6 The forecast for fleet modernisation for each of the scenarios assessed (this includes a 'without development' scenario) within this 2022 ES Addendum is referred to in **Table 2.2** above and presented in full in **Appendix 8B** in **Volume 3: Figures and Appendices**. This forecast is based on current replacement schemes for the airlines using LLA and is consistent with the financial incentives what would arise from the Proposed Scheme for airlines to utilise the increased passenger / flight quotas available and so to invest further in their fleet in the way they are proposed in their current replacement schemes. The assumptions regarding the fleet renewal have been based on the following:

- Wizz has expedited fleet renewal in the period since the original forecast was produced, although they were assumed to be fully modernized by 2028[2], which remains the case.

[2] https://wizzair.com/static/docs/default-source/default-document-library/earnings-deck-q3-f22---vf_3_c3ce6645.pdf [Accessed 23 June 2022]

- easyJet delayed some fleet orders during the pandemic but are to return to pre-pandemic delivery by 2027[3]. On 21 June 2022, easyJet confirmed an order for new aircraft to support their replacement of the A319 by 2029[4].
- Whilst there are some short-term production issues at Boeing that have been the subject of media coverage, these are unlikely to impact the longer-term delivery schedules[5].
- Other airlines are likely to offer fleet renewal benefits with Blue Air already delivering newer aircraft, and Wizz purchasing slots from Vueling, with Wizz having a faster fleet renewal program[6].
- Most (covering over 90% of passengers) passenger airline bilateral agreements offer incentives to encourage the use of the more modern aircraft types (for example Airbus NEOs and Boeing MAXs) within the LLA operation.
- LLA has taken steps to mitigate any previous breach or unexpected breach in planning conditions with measures that were explained in the S73 Application. Additional local rules have also been applied to the slot scheduling process, which limits the number of movements an airline can operate per season.

2.3.7 Additionally, **Appendix 8B** in **Volume 3: Figures and Appendices** also shows the fleet mixes that would be required to meet the current Condition 10 contour limits. These fleet mixes have been generated in light of 2019 actual movement figures, but with appropriate adjustment to reflect the level of fleet modernisations that have since occurred Thus in 2019 the percentage of modernised aircraft on the fleet was 6%, but in 2022 it is expected to have reached 22%. A reduction factor was then applied across the movements until a compliant contour was generated by the model. By comparing these Condition 10 compliant fleet mixes with the 2019 18 mppa actual movements, one is able to assess the economic consequence of compliance with the existing Condition 10 limits.

2.3.8 As already summarised, LLA is seeking a variation to Condition 10. The proposed variation to Condition 10 seeks to temporarily enlarge the noise contours to the end of 2025 whilst the development of newer, quieter aircraft progresses and comes into operation. The proposed variation is sought in light of (amongst other things) potential occasional breaches of the summer night-time contour during 2017, 2018, and 2019. It is understood the daytime contour was exceeded in 2019 by 1.4 km^2 at 20.8 km^2.

2.3.9 The Proposed Scheme will enable the area enclosed by the 57 dB(A) $L_{Aeq16hr}$ daytime (0700-2300) noise contour to increase temporarily from 19.4 km^2 to 21.1 km^2; and the area enclosed by the 48 dB(A) L_{Aeq8hr} (2300-0700) night-time noise contour to increase temporarily from 37.2 km^2 to 42.1 km^2 for the period up to the end of 2027 only. The change to the noise contours for this period is shown in **Figure 6.7** and **Figure 6.8** in **Volume 3: Figures and Appendices**.

2.3.10 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) Leq16hr (0700-2300) and above and for night-time noise to 35.5 sq km for the area exposed to 48 dB(A) Leq8hr (2300-0700) and above. The change to the noise contours sought is shown in **Figure 6.15** and **Figure 6.16** in **Volume 3: Figures and Appendices**.

[3] https://otp.tools.investis.com/clients/uk/easyjet1/rns/regulatory-story.aspx?cid=2&newsid=1439398 [Accessed 23 June 2022]

[4] Proposed purchase of aircraft (investis.com) [Accessed 30 June 2022]

[5] https://www.flightglobal.com/airframers/wire-connector-shortages-hamper-737-max-production/148612.article [Accessed 23 June 2022]

[6] https://www.acl-uk.org/wp-content/uploads/2022/03/W9VY.pdf [Accessed 23 June 2022]

2.3.11 At the end of 2030, Condition 10 will require LLAOL or any successor or airport operator to reduce the area of the noise contours for daytime noise to 15.1 sq km for the area exposed to 57 dB(A) Leq16hr (0700-2300) and above and for night-time noise to 31.6 sq km for the area exposed to 48 dB(A) Leq8hr (2300-0700) and above, which would bring the contours back to where they would have been in 2030 with the current permission. The change to the noise contours sought is shown in **Figure 6.17** and **Figure 6.18** in **Volume 3: Figures and Appendices**.

Passenger movements

2.3.12 **Table 2.3** below updates Table 3.4 in the 2021 ES Addendum to show the total passengers forecast at the time of the 2014 Planning Permission compared with actual passenger numbers that occurred in the years 2016 – 2021 and those which are now forecast for 2022-2031. The table shows that the 2012 ES passenger growth was forecasted to be slower than that which has occurred and in 2018 Luton Airport handled an additional 4 mppa more passengers than expected.

Table 2.3 Annual passenger forecasts from 2014 Planning Permission Vs. latest updated actuals and forecasts

Year	Forecast in 2012 (mppa)	Actual mppa (A) / Updated Forecast (F) (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	4.7 A
2022	14.8	12.4 F
2023	15.4	16.0 F
2024	15.8	18.1 F
2025	16.6	19.0 F
2026	17.3	19.0 F
2027	17.7	19.0 F
2028	17.8	19.0 F

2029	17.8	19.0 F
2030	17.8	19.0 F
2031	17.8	19.0 F

Source: London Luton Airport Operations Limited, 2022

Notes: A - Actual passenger numbers
F - Forecast passenger numbers

2.3.13 As shown in **Table 2.3** above, there has been significant growth in passenger numbers exceeding that predicted at the time of the 2014 Planning Permission (with respect to years now reached), and LLA has reached the 18 mppa passenger cap nine years earlier than anticipated. Although passenger numbers have subsequently decreased from 2020 as a result of COVID-19, LLA has forecasted that passenger levels will realistically return to 18 mppa in 2024 (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 potential breaches of the summer night-time noise contour area limit for 2017, 2018, and summer daytime and night time in 2019. Such exceedances were despite the operator's best efforts through a series of steps, such as a ban on the noisiest types of aircraft. If measures were not taken and growth continued, then there could be potential breaches.

2.3.14 **Table 2.4** updates Table 3.5 in the 2021 ES Addendum to include actual numbers for 2021, and 2022. The table presents the existing noise contour limits, the actual contours for 2017 – 2022, and those sought through the S73 application for 2023 onwards.

Table 2.4 Noise contour limits

	Daytime (km^2)	Actual & Forecast summer daytime movements	Night time (km^2)	Actual & Forecast summer night-time movements
CURRENT LIMIT (2021-2027)	19.4	-	37.2	-
FUTURE EXISTING LIMIT (2028+)	15.2	-	31.6	-
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
ACTUAL NOISE CONTOUR AREA (2020)	12.2	17,369	28.8	2,658
ACTUAL NOISE CONTOUR AREA (2021)	10.9	17,522	23.9	2,100
ACTUAL NOISE CONTOUR AREA (2022)	15.7	32,035	31.9	4,776

	Daytime (km^2)	Actual & Forecast summer daytime movements	Night time (km^2)	Actual & Forecast summer night-time movements
FORECAST NOISE CONTOUR AREA (2023)	21.1	34,706	42.1	4,210
FORECAST NOISE CONTOUR AREA (2024, 18 mppa)	20.4	35,003	41.9	4,232
FORECAST NOISE CONTOUR AREA (2025, 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
FORECAST NOISE CONTOUR AREA (2031, 19 mppa)	14.7	34,987	31.5	4,764

Source: London Luton Airport Operational Limited, 2022

3. Approach to preparing the Environmental Statement Addendum

3.1 The Environmental Impact Assessment methodology

3.1.1 To complete this 2022 ES Addendum, a review of all the topics assessed in the 2021 ES Addendum was undertaken by the technical specialists. The review determined whether the findings of the assessments previously undertaken remain valid, when considering the updates to the aircraft movements and passenger forecasts presented in **Section 2.3** above. The forecast updates were required to account of the elapsed time since the Application was made in January 2021.

3.2 Updates to Environmental Assessments

3.2.1 The following sections describe how each of the topic assessments, presented in the 2021 ES Addendum, has been updated where relevant to account for the delay of the 2022 and 2023 forecasts by one year to 2023 and 2024 respectively, with the subsequent catch up of forecasts to pre-COVID-19 conditions completed by 2028.

Air Quality

3.2.2 Air quality emission factors and background pollutant concentrations vary on an annual basis, therefore a change in the realistic worst-case year for maximum emissions, when 19 mppa is forecast to be reached, from 2024 to 2025 has the potential to have implications for the air quality assessment. The air quality assessment presented in the 2021 ES Addendum has therefore been reviewed to established whether, despite of these changes, the conclusions remain valid and whether there are any likely significant effects that need to be reported. **Chapter 4: Air quality** addresses these changes in pollutant emissions and background concentrations and provides an update on baseline air quality monitoring data collected since the 2021 ES Addendum was produced.

3.2.3 The air quality baseline for this 2022 ES Addendum has been derived from published monitoring data collected by the Airport and local authorities over the period 2014 to 2019. This is because 2019 is the latest available full year of data unaffected by the COVID-19 pandemic.

3.2.4 The background concentrations for future years (2023, 2024, 2025, and 2028) remain those derived from the Defra issued projections of background (non-roadside) concentrations on a 1 km square basis, up to 2030.

3.2.5 Air quality is generally predicted to improve each year through the replacement of older road vehicles, such that pollutant concentrations in 2024 will be higher than in 2025. The air quality assessment takes account of the information as to lower emissions in 2025 and demonstrates that the assessment already presented in the 2021 ES Addendum for 2024 is worst-case. It is therefore unnecessary to produce an additional update that considers the concentrations in 2025, as they would be lower than those in 2024.

Noise

3.2.6 The baselines that have been adopted for the noise assessment for the identified assessment scenarios, are presented in **Table 3.1** below.

3.2.7 Key points to note regarding the choice of baseline, the assessment scenarios and the overall approach to the noise assessment are as follows:

- The S73 Application is seeking to vary current Condition 10 and 18mppa, therefore the 18mppa baselines reflect the effect current Condition 10 consented contour limits.
- The 2019 actual movements for the Airport operating at 18mmpa provide a reflection of the impacts of a 18mppa operation save where exceedances of the noise requirements. Therefore, the baseline noise contours in the noise assessment have used the 2019 actual movements for the 92-day period, but with a percentage reduction factor applied to reflect operations with the contours met the condition limits. This demonstrates the impacts of operating the Airport in compliance with the conditions with a representative fleet mix from 2019.
- In 2019 the percentage of modernised fleet was 6%. Summer 2022 is expected to see a percentage modernisation of 20-25% therefore the fleet mix used for the noise assessment has been updated to account for this shift. The methodology used to complete this was to take the 2019 actual movements, modernise the relevant fleets accordingly and then apply the reduction factor to the point that the condition limit was met.

Table 3.1 Baselines for Environmental Assessment and their rationale

Assessment Scenario	Baseline	Rationale
2023 & 2024 18 mppa, and 2025 19 mppa	Condition 10 noise contour limit of the area enclosed by the 57dB(A) Leq16hr (0700-2300) contour shall not exceed 19.4 sq km for daytime noise, and the area enclosed by the 48dB(A) Leq8hr (2300-0700) contour shall not exceed 37.2 sq km for night-time noise.	The reason for not using the actual 2019 noise contour as a baseline was because the noise limits imposed by Condition 10 were already being exceeded during that year. This would mean that the assessment would have been carried out against a non-compliant, and inflated baseline , which would have reduced the identified effects of the 19 mppa proposals. It was therefore considered an inappropriate baseline.
2028 & 2031 19 mppa	Condition 10 future noise contour limit of the area enclosed by the 57dB(A) Leq16hr (0700-2300) contour shall not exceed 15.2 sq km for daytime noise, and the area enclosed by the 48dB(A) Leq8hr (2300-0700) contour shall not exceed 31.6 sq km for night-time noise.	This is based on the airport fully utilising the current allowed Condition 10 noise contour limits.
2028 19 mppa	The 'without Proposed Scheme' 2028 scenario of 12.4 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	This is to show the comparison in noise levels with the baseline within the original ES associated with Condition 10.

3.2.8 The population and dwelling counts used in the updated noise and health assessments have been based on the latest available year of data from CACI Limited, which is 2022.

Greenhouse Gases and Climate

3.2.9 The GHG baseline from the UK as a whole for this 2022 ES Addendum has been derived from data published by BEIS over the period 1990 to 2019, and from the data for 2019 published by London Luton Airport in its Annual Monitoring Report. This is because 2019 is the latest available full year of data unaffected by the COVID-19 pandemic.

3.2.10 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 (and

the future with development scenario) have been calculated under three future emission scenarios (upper, central, and lower emission scenarios) using the latest statistics published by BEIS.

3.2.11 The ES Addendum presents new policy arising since the 2021 ES Addendum, and slightly altered emission numbers and conclusions based on contextualisation around emerging projections of aviation emissions.

Health

3.2.12 The Health assessment, presented in the 2021 ES Addendum, focused on the predicted health effects related to the change in noise exposure linked to the proposed Condition 10 variation. **Chapter 7: Health** of this 2022 ES Addendum therefore provides an update to the likely significant effects of the Proposed Scheme with respect to human health effects resulting from the changes to the in-air aircraft noise assessment presented in **Chapter 6: Noise**.

Transport

3.2.13 **Chapter 8: Transport** of this 2022 ES Addendum addresses potential changes in traffic flows generated by the Proposed Scheme that result from the change in the year when 19 mppa is forecast to be reached, from 2024 to 2025. Updates have also been made to the assessment against the Travel Plan targets for 2025.

4. Air quality

4.1 Introduction

4.1.1 In **Chapter 6: Air Quality** of the 2021 ES Addendum (2021 ESA) it was concluded that all impacts on human health receptors are classified as **negligible** in terms of the IAQM/EPUK guidance,[7] and all impacts on ecological receptors are classified as **not significant** under Environment Agency guidance. In the assessment year of 2024, predicted concentrations of annual mean nitrogen dioxide (NO_2) were found to increase by at most 0.7 µg m^{-3} 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 NO_2 concentration here is modelled to be 22 µg m^{-3}. Overall, the potential impacts of the proposed variation to Condition 8 (Passenger throughput cap) of the Proposed Scheme were considered to be **not significant**.

4.1.2 In air quality assessments, emission factors and background pollutant concentrations vary on an annual basis, therefore, the change in the year when 19 mppa is forecast to be reached from 2024 to 2025 has been considered to ascertain whether there might be any change to the conclusions of the previous air quality assessment. This chapter of the 2022 ES Addendum addresses the changes in pollutant emissions and background concentrations and provides an update on baseline air quality monitoring data collected since the 2021 ESA was produced.

4.2 Baseline

4.2.1 Luton Borough Council (LBC), London Luton Airport Operations Ltd (LLAOL), London Luton Airport Ltd) trading as Luton Rising) (LLAL) and the Department of Environment, Food and Rural Affairs (Defra) undertake air quality monitoring. New data have been published since the 2021 ESA was produced and are presented here.

4.2.2 Continuous air quality monitoring has been undertaken at three relevant monitoring stations in recent years. Station LN60 is located in the town centre Air Quality Management Area (AQMA) and measures NO_2 and Particulate Matter (PM_{10}, PM_4, $PM_{2.5}$ and PM_1). Station LA08 is located on the Airport south of the terminal building, and measures PM_{10} only. The Luton Airport FutureLuToN monitoring station (LA001) was established in 2019 and monitors NO_2, PM_{10} and $PM_{2.5}$ in Wigmore Valley Park. Defra operates a continuous monitor, CM2, as part of the Automatic Urban and Rural Network on the east side of Luton, measuring NO_2.

4.2.3 Passive monitoring of NO_2 with diffusion tubes has also been undertaken. The locations of the monitoring stations used to inform the assessment are summarised in **Table 6.4**, **Figure 6.2**, and **Figure 6.3** of the 2021 ESA. Station LA001 is located at grid reference 512578, 222204.

4.2.4 Monitored annual mean NO_2 concentrations at monitoring sites used in the 2021 ESA, plus LA001 are summarised in **Table 4.1**[8]. These may be compared with the annual average Air Quality Objective (AQO) of 40 µg m^{-3} but note that the AQO does not apply at all monitoring locations, in particular those on the airport. The AQO applies at locations where the public are expected to

[7] IAQM/EPUK (2017) *Land-Use Planning & Development Control: Planning For Air Quality*. [online] Accessed at: https://iaqm.co.uk/text/guidance/air-quality-planning-guidance.pdf [Accessed 27/06/2022]
[8] Luton Borough Council (2021) 2021 Air Quality Annual Status Report (ASR) [online] Accessed at: https://www.luton.gov.uk/Environment/Lists/LutonDocuments/PDF/Environmental%20and%20Consumer%20Services/Pollution/2021-air-quality-annual-status-report.pdf [Accessed 27/06/2022]

spend a relevant period of time for the annual average, for example homes and schools. The table therefore gives the distance to the nearest relevant exposure.

4.2.5 Overall, concentrations at the majority of these locations show a downward trend over the period 2013 – 2019. This is typical of measurements recorded elsewhere in England and 2019 results are broadly consistent with this trend. 2020 results are presented for information but have not been used in averages as concentrations were affected by both reduced emissions as a result of COVID-19 lockdowns and logistical monitoring challenges during the lockdowns.

Table 4.1 Monitored annual mean NO_2 concentrations (µg m^{-3})

Receptor ID	Distance to relevant exposure (m)	2016	2017	2018	2019	2020	Average 2013-2019
M01	6.2	**47**	39	37	**40**	28	**41.2**
M03	17.1	**50**	**44**	**43**	39	31	**44.2**
M04	7	31	30	26	27	20	29.9
M05	5	36	35	30	31	25	34.3
M06	4	39	36	34	33	26	36.9
M07	2	28	24	24	22	17	26.4
M08	0	25	23	22	23	16	22.9
M09	18	36	37	30	35	25	33.4
M10	0	24	22	20	22	16	22.3
M11	17	30	29	28	30	21	29.3
M12	0	21	20	20	20	13	20.7
M13	6	30	30	28	28	30	28.6
M14	15	**46**	**46**	**40**	39	33	**43.9**
M15	0	34	33	28	28	21	32.0
M16	0	34	34	27	28	23	32.6
M17	0	34	33	29	27	22	32.6
M18	0	34	31	30	28	22	31.6
M19	19	NDA	38	32	31	22	33.7
M20	0	NDA	32	27	28	21	29.0
M21	13	NDA	25	25	22	16	24.0
M22	8.5	NDA	27	25	25	17	25.7
M23	0	NDA	NDA	28	30	23	29.0
M24	21	NDA	**42**	37	39	28	39.3

Receptor ID	Distance to relevant exposure (m)	2016	2017	2018	2019	2020	Average 2013-2019
M25	700	NDA	NDA	**46**	**48**	**48**	**47.0**
M26	880	**40**	38	38	34	21	34.9
M27	1,000	24	23	25	22	16	22.3
M28	550	17	19	18	18	11	17.4
M29	585	**43**	**40**	**40**	37	22	38.3
M30	230	34	35	35	34	22	32.3
M31	900	NDA	NDA	**44**	**46**	NDA	**45.0**
M32	820	34	32	32	32	20	29.7
M33	30	10	11	11	10	8	10.3
M34	30	12	11	12	11	8	11.6
M35	130	15	15	15	13	9	13.3
M36	420	39	38	38	36	22	35.0
M37	35	27	25	26	24	16	25.1
M38	700	NDA	NDA	**42**	**42**	23	**42.0**
M39	32	NDA	NDA	32	31	21	31.5
M40	1,000	NDA	NDA	**44**	**44**	NDA	**44.0**
M41	230	NDA	NDA	**40**	32	20	36.0
M42	190	NDA	NDA	38	29	20	33.5
M43	620	31	33	NDA	NDA	NDA	32.2
M44	780	36	**46**	NDA	NDA	NDA	31.2
M45	690	**41**	**40**	NDA	NDA	NDA	36.0
M46	100	14	14	NDA	NDA	NDA	14.0
M47	11	12	NDA	NDA	NDA	NDA	12.0
M48	1,000	NDA	**41**	NDA	NDA	NDA	**41.0**
M49	75	NDA	NDA	NDA	NDA	NDA	NDA
LLA001	N/A	NDA	NDA	NDA	16	11*	13.5

NDA = No data available
* provisional
Exceedances of AQO of 40 µg m^{-3} shown in bold

4.2.6 Monitored annual mean PM_{10} concentrations are summarised in **Table 4.2**. These may be compared with the AQO of 40 µg m^{-3}, but this AQO does not apply at all monitoring locations, in

particular those on the airport. **Table 4.2** therefore gives the distance to the nearest relevant exposure.

4.2.7 Over the period 2015 to 2019, monitored annual mean PM_{10} concentrations at the M02 (LA08, HB006) continuous monitor, sited on LLA, were in the range 15 – 16 µg m^{-3}, well below the AQO of 40 µg m^{-3}.

Table 4.2 Monitored annual mean PM_{10} concentrations (µg m^{-3})

Receptor ID	Distance to relevant exposure (m)	2015	2016	2017	2018	2019	2020	Average (not including 2020)
M01	6.2	15	15	16	16	16	14	15.6
M02	800	15	18	18	17	16	14	17.5
LA001	N/A	NDA	NDA	NDA	NDA	14	11	12.5

NDA = No data available

4.2.8 Monitored annual mean $PM_{2.5}$ concentrations are summarised in **Table 4.3**. These may be compared with the AQO of 20 µg m^{-3}.

4.2.9 Over the period 2013 to 2019, 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 20 µg m^{-3}.

Table 4.3 Monitored annual mean $PM_{2.5}$ concentrations (µg m^{-3})

Receptor ID	Distance to relevant exposure (m)	2015	2016	2017	2018	2019	2020	Average (not including 2020)
M01	6.2	9	10	10	10	10	8	9.8
LA001	N/A	NDA	NDA	NDA	NDA	12	10	10.6

NDA = No data available

4.3 2025 Emission Factors

4.3.1 As reported in the 2021 ESA, 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. Emissions from road traffic are therefore a major determinant of pollutant concentrations at most sensitive receptors around airports. Operational changes arising from the increase to 19mppa are expected to generate additional surface access movements. As reported in **Chapter 8: Transport**, forecast 2025 airport related flows are expected to remain the same as in 2024.

4.3.2 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 a result of this, the emission factors used in air quality assessments reduce each year. The 2024 emission factors from

the Defra Emissions Factors Toolkit[9] used in the 2021 ESA can be compared with the 2025 factors that are now available. **Table 4.4** shows emission factors for the M1 (Annual Average Daily Traffic (AADT) of 167,252, 12% Heavy Duty Vehicles (HDV)). PM emissions are marginally lower in 2025 than 2024, whilst nitrogen oxides (NO_X) emissions are 11% lower.

Table 4.4 Emission factor comparison

EFT Version	Year	All vehicles NO_X emission factor (g/km/s)	%	All vehicles PM_{10} emission factor (g/km/s)	%	All vehicles $PM_{2.5}$ emission	%
EFT v10.1 (used in 2021 ESA)	2024	0.550	100	0.047	100	0.030	100
EFT v11.0 (released November 2021)	2024	0.550	100	0.047	100	0.030	100
EFT v11.0 (released November 2021)	2025	0.489	89	0.047	99	0.209	98

4.4 2025 Background Pollutant Concentrations

4.4.1 Pollutant concentrations at any receptor location are made up of a local contribution from pollutants emitted near to the receptor (such as vehicles on a road) and a background contribution from emissions in the region. Defra maintains a nationwide model (the Pollution Climate Mapping (PCM) model[10]) of current and future background air quality concentrations at a 1 km grid square resolution up to 2030. The data sets include annual average concentration estimates for NO_x, NO_2, PM_{10} 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 Inventory (NAEI)[11] to 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.

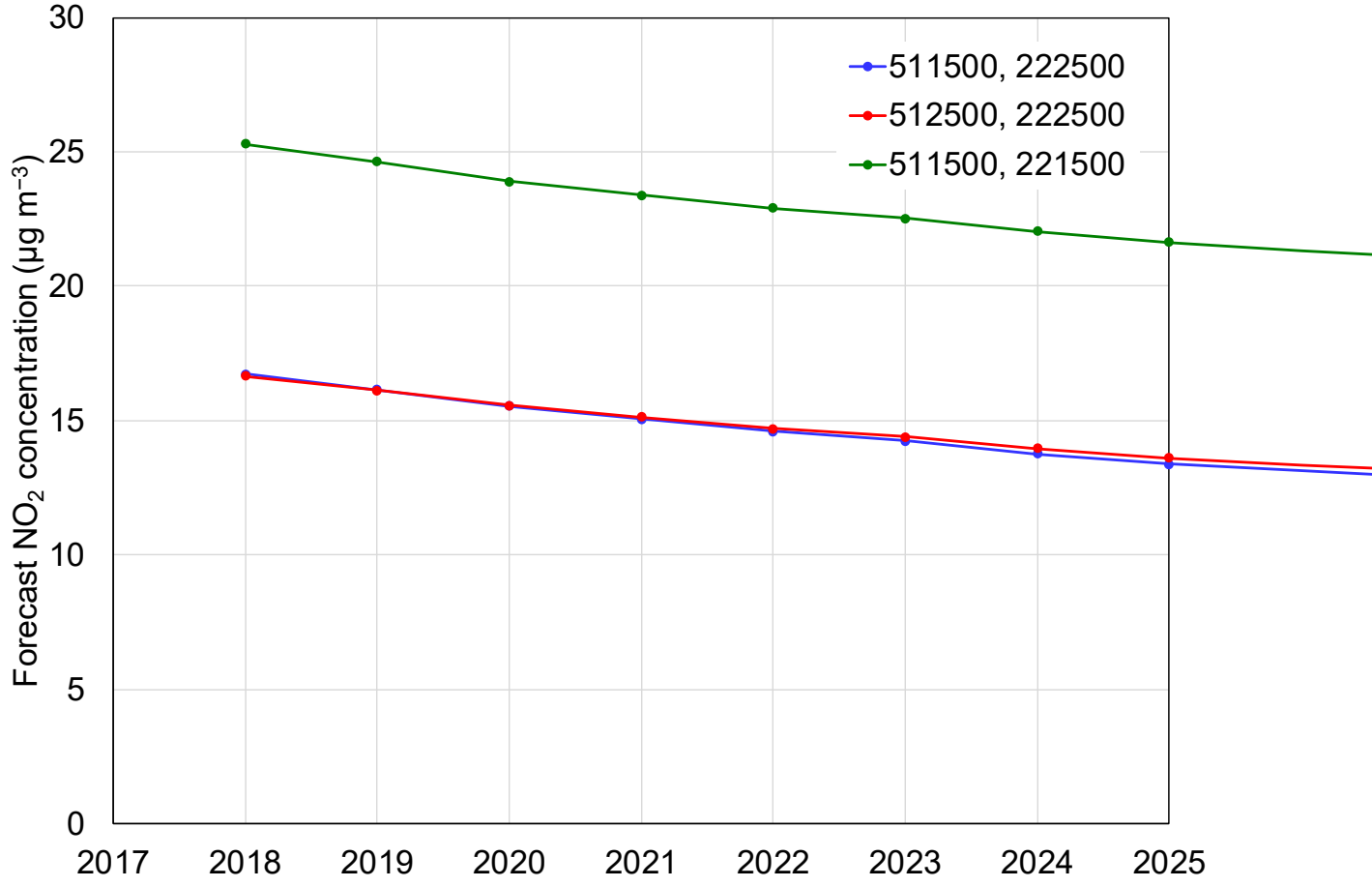
4.4.2 The total projected concentrations of NO_2 are shown in **Figure 4.1** for a typical grid square covering LLA (green line) and two grid squares covering nearby receptors (red and blue lines). Concentrations are expected to fall by about 20% between 2018 and 2025, or about 0.5 µg m^{-3} per year. Background concentrations are therefore expected to be lower in 2025 than in the assessment year of 2024 used in the 2021 ESA.

[9] https://laqm.defra.gov.uk/air-quality/air-quality-assessment/emissions-factors-toolkit/

[10] 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 27/06/2022]

[11] UK Government. *National Atmospheric Emissions Inventory*. Available at: https://naei.beis.gov.uk/ [Accessed 27/06/2022]

Figure 4.1 Trend in modelled background NO_2 concentrations



4.5 Conclusions

Comparison with 2021 ESA

4.5.1 In conclusion, as a result of changes such as the replacement of older vehicles with newer ones that meet tighter emission standards, both emission rates and background pollutant concentrations are expected to be lower in 2025 than in 2024. Pollutant concentrations are therefore expected to be slightly lower in 2025 than in 2024, the assessment year used in the 2021 ESA. This will apply to both the 'without development' and 'with development' case; therefore, the magnitude of impact (the 'Process Contribution' (PC)) would be expected to be of a similar magnitude.

4.5.2 For a 2025 assessment of 19mppa for human health receptors, impacts at all modelled receptors would remain **negligible**, in terms of the significance criteria used. There would be no new exceedances of the AQOs. Annual mean concentrations would be less than 70% of the AQOs at all modelled receptors.

4.5.3 The conclusions of the 2021 ESA are therefore considered to remain valid. In 2025 effects on both human health and ecological receptors would be considered **not significant**.

Consideration of sensitivity - Condition 10 noise contour limit compliant future baseline

4.5.4 As mentioned in **Section 3.2**, and **Chapter 6: Noise**, the noise assessment has used a future baseline, against which the Proposed Scheme is assessed, that is compliant with the Condition 10

noise contour limit (area enclosed by the 57dB(A) Leq16hr (0700-2300) contour shall not exceed 19.4 sq km for daytime noise, and the area enclosed by the 48dB(A) Leq8hr (2300-0700) contour shall not exceed 37.2 sq km for night-time noise). The 2019 baseline (18mppa) was not used as the noise limits imposed by Condition 10 were already being exceeded during that year.

4.5.5 For a Condition 10 compliant future baseline in 2025, the air quality assessment would have around 5% fewer flights than the 18mppa future baseline, and a proportionate decrease in road traffic trip generation. The lower emissions would mean that the magnitude of impact of the Proposed Scheme (the difference in concentration between the 'without development' and 'with development' scenarios) would notionally increase.

4.5.6 However, because of the IAQM/EPUK significance criteria[7] applied, reproduced in **Table 4.5**, the conclusions themselves would not change and no likely significant effects would occur. The maximum impact in NO_2 concentration in the 2021 ESA (0.7 µg m^{-3}) was predicted to occur at receptor H83 close to the M1 motorway near Junction 11 where the total 'with development' NO_2 concentration in 2024 was predicted to be 22 µg m^{-3}. For the impact at this receptor to become 'slight' rather than negligible, the impact would need to be over 2.4 µg m^{-3} (over 3.5 times higher than modelled). A 5% reduction in emissions from flights and road traffic trips in the 'without development' scenario could not lead to impacts of this magnitude, as impacts would be expected to be of a similar magnitude to those resulting from an increase from 18mppa to 19mppa (0.7 µg m^{-3}). Therefore, the conclusions that impacts at all modelled receptors would be **negligible** and overall effects would be **not significant** are considered to remain valid.

Table 4.5 Impact Descriptors for Individual Receptors (IAQM/EPUK)

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

5. Climate

5.1 Introduction

5.1.1 In **Chapter 7: Climate** of the 2021 ES Addendum (2021 ESA), it was concluded to be 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 Act 2008 (as amended)[12]. The Proposed Scheme was considered to have a **low greenhouse gas (GHG) emissions magnitude**. The overall effect of GHGs associated with the Proposed Scheme on the global climate was considered **minor adverse** and therefore **not significant**.

5.1.2 The year in which 19 mppa is forecast to be reached has changed from 2024 to 2025. This chapter of the ES Addendum provides results for the assessment year of 2025. There have also been some minor methodological changes, updates to assumptions around Sustainable Aviation Fuel (SAF), and updates in the context of relevant policy that have been published since the drafting of the 2021 ESA.

5.2 Relevant legislation, planning policy and technical guidance

5.2.1 Since the 2021 ESA was drafted, new or updated legislation, planning policy and technical guidance has been published that has relevance to the assessment of the effects of the Proposed Scheme on GHG emissions. These are described below. Following a further extensive review of relevant policy, additional relevant references not included in the 2021 ESA have also been included. All other relevant legislation, planning policy, and technical guidance can be found in **Section 7.3** of the 2021 ESA.

Legislative context

5.2.2 The Climate Change Act 2008 (as amended)[12] sets a UK national target of net zero emissions by 2050. In line with advice from the independent advisors to the UK Government, the Climate Change Committee (CCC), the Government sets five-year Carbon Budgets with a view to achieving the UK national target. Carbon Budgets[13] have traditionally been set having regard to a 'headroom' allowance, known as the 'planning assumption', for international aviation. In other words, the size of each successive carbon budget has been set at a lower level than would otherwise be required to allow for the planning assumption. The 'planning assumption' allowed for in all carbon budgets up to and including the fifth budget is 37.5 $MtCO_2$ which reflects the advice of the CCC in '*Meeting the UK aviation target – options for reducing emissions to 2050*'[14].

5.2.3 On the advice of the CCC, the UK has set what is considered the world's most ambitious climate change target, aiming to reduce emissions by 78% by 2035 compared to 1990 levels. This has been included in the Sixth Carbon Budget[15], legislated in June 2021. The Carbon Budget includes the

[12] Climate Change Act 2008. [online]. Available at: http://www.legislation.gov.uk/ukpga/2008/27/contents [Accessed 21 June 2022].
[13] The first three carbon budgets were introduced in The Carbon Budgets Order 2009, 20 May 2009 (https://www.legislation.gov.uk/uksi/2009/1259/pdfs/uksi_20091259_en.pdf). The Fourth Carbon Budget was introduced in The Carbon Budget Order 2011, 29 June 2011 (https://www.legislation.gov.uk/uksi/2011/1603/made). The Fifth Carbon Budget was introduced in The Carbon Budget Order 2016, 20 July 2016 (https://www.legislation.gov.uk/uksi/2016/785/made/data.pdf).
[14] CCC (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 June 2022].
[15] The Carbon Budget Order 2021. [online]. Available at: https://www.legislation.gov.uk/uksi/2021/750/contents/made [Accessed 21 June 2022].

UK's share of international aviation and shipping emissions, rather than allowing for them by the use of a 'planning assumption'.

5.2.4 As part of the withdrawal from the European Union (EU), the UK Emissions Trading Scheme (UK ETS) replaced the UK's participation in the EU ETS on 1 January 2021. The UK ETS was established through the 2020 Greenhouse Gas Emissions Trading Scheme Order[16]. The aviation scope for the UK ETS covers UK domestic flights, flights between the UK and Gibraltar, and flights from the UK to the European Economic Area (EEA). All airlines operating such flights need to secure sufficient UK ETS allowances equivalent to the carbon emissions from those flights. The total number of allowances within the UK ETS is capped and is reduced, year on year.

5.2.5 On 26 May 2021, the Air Navigation (Carbon Offsetting and Reduction Scheme for International Aviation) Order 2021[17] came into force providing details of the requirements for monitoring, reporting and verification of emissions for the purposes of complying with the Greenhouse Gas Emissions Trading Scheme Order[16].

5.2.6 The Explanatory Memorandum[18] which accompanies the 2020 Greenhouse Gas Emissions Trading Scheme Order makes it clear that the UK Government's intention is that the UK ETS and EU ETS can operate side by side, which could increase opportunities for emissions reduction and cost-efficiency of emissions trading.

5.2.7 Emissions from international flights not included in the UK ETS are covered by the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) developed by the International Civil Aviation Organization (ICAO). In 2010, the 37th Session of the ICAO Assembly adopted two aspirational goals: (1) to improve energy efficiency by 2% per year until 2050; and (2) to achieve carbon neutral growth from 2020 onwards. These goals are to be met with the implementation of a basket of measures that includes technological innovations, operational improvements, sustainable aviation fuels, and market-based measures. At the 39th Session of the ICAO Assembly in 2016, States adopted a global market-based measure scheme for international aviation, CORSIA, to address the increase in total CO_2 emissions from international aviation above the 2020 levels (now revised, following COVID, to 2019 levels). CORSIA will be implemented in three phases: a pilot phase from 2021 to 2023, a first phase from 2024 to 2026, and a second phase from 2027 to 2035. For the pilot and first phase (2021 to 2026), participation is voluntary. As of 14 July 2021, 106 States, including the UK[19], are participating, representing more than 77% of international aviation[20]. CORSIA requires all airlines operating a route between two participating States (e.g., UK and USA) to monitor, report and verify the emissions from flights on that route, and for those emissions to be offset using CORSIA eligible emission units[21].

5.2.8 ICAO is also exploring the feasibility of a long-term global aspirational goal for international aviation, as requested by the 40th Session of the ICAO Assembly, noting the commitments by various bodies representing the international aviation sector to reduce carbon emissions by 50%

[16] The Greenhouse Gas Emissions Trading Scheme Order 2020. [online]. Available at: https://www.legislation.gov.uk/uksi/2020/1265/contents/made [Accessed 21 June 2022].
[17] The Air Navigation (Carbon Offsetting and Reduction Scheme for International Aviation) Order 2021. [online]. Available at: https://www.legislation.gov.uk/uksi/2021/534/made [Accessed 21 June 2022].
[18] BEIS (2020). Explanatory Memorandum to the Greenhouse Gas Emissions Trading Scheme Order 2020 No. 1265. [online]. Available at: https://www.legislation.gov.uk/uksi/2020/1265/pdfs/uksiem_20201265_en.pdf [Accessed 21 June 2022].
[19] The Monitoring, Verification and Reporting (MRV) requirements are being implemented via The Air Navigation (Carbon Offsetting and Reduction Scheme for International Aviation) Order 2021, enacted 26th May 2021. The offsetting requirements will be implemented via a second Statutory Instrument due in 2022, taking into account the UK ETS.
[20] ATAG (2021). Who volunteers for CORSIA. [online]. Available at: https://aviationbenefits.org/environmental-efficiency/climate-action/offsetting-emissions-corsia/corsia/who-volunteers-for-corsia/ [Accessed 23 June 2022].
[21] ICAO (2019). Chapter 6 Climate Change Mitigation: CORSIA. [online]. Available at: https://www.icao.int/environmental-protection/CORSIA/Documents/ICAO%20Environmental%20Report%202019_Chapter%206.pdf [Accessed 21 June 2022].

from 2005 levels by 2050[22]. '*Flightpath to the Future*'[23] states that the UK Government supports the adoption of an ambitious long-term aspirational goal by the ICAO that aligns with global temperature targets of 1.5°C. Progress on this by the ICAO is expected to be discussed at its 41st Assembly in September / October 2022 based on a feasibility report published in March 2022[24] that details the output of two years of research. Reference is made to this research in **Section 5.4**, and **Appendix 5A**, which describe the assumptions used in calculating future carbon emissions.

5.2.9 The Carbon Budgets and planning assumption (see **paragraph 5.2.2**) are detailed in **Table 5.1**, along with identifying the mechanisms for reporting and reducing net emissions from domestic, EEA and rest of the world flights[25].

Table 5.1 UK Carbon Budgets.

Period	2018 - 2022	2023 - 2027	2028 - 2032	2033 - 2037	2038 - 2042	2043 - 2047	2048 - 2052
Carbon budget period	3rd	4th	5th	6th	7th	8th	9th
Carbon budget ($MtCO_2e$)[13,15]	2,544	1,950	1,725	965			
Annualised carbon budget ($MtCO_2e$)	508.8	390	353	193	No details published but expected to follow the Sixth Carbon Budget, with budgets reducing to net zero by 2050.		
Annual planning assumption for international aviation ($MtCO_2e$)	37.5	37.5	37.5	0			
CCC recommended sectoral carbon budget allocation for aviation ($MtCO_2e$)[26]	33 (2022 only)	181	166	153	144	129	72 (to 2050)
Domestic aviation	Included in carbon budget and UK ETS from 1 Jan 2022	Included in carbon budget and UK ETS	Included in carbon budget and UK ETS	Included in carbon budget and UK ETS	No details published but expected to follow the Sixth Carbon Budget, with budgets reducing to net zero by 2050.		
EEA aviation	Not included in carbon budget but included in UK ETS from 1 Jan 2022	Not included in carbon budget but included in UK ETS	Not included in carbon budget but included in UK ETS	Included in both carbon budget and UK ETS			

[22] ICAO (2019). Assembly 40th Session 2019, Resolution A40-18: Consolidated statement of continuing ICAO policies and practices related to environmental protection - Climate change. Available at: https://www.icao.int/environmental-protection/Documents/Assembly/Resolution_A40-18_Climate_Change.pdf [Accessed 21 June 2022].
[23] DfT (2022). Flightpath to the Future. [online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1079042/flightpath-to-the-future.pdf [Accessed 21 June 2022].
[24] ICAO (2022). Report on the feasibility of a long-term aspirational goal (LTAG) for international civil aviation CO_2 emission reductions, ICAO Committee on Aviation Environmental Protection (CAEP), March 2022. [online]. Available at: https://www.icao.int/environmental-protection/LTAG/Documents/REPORT%20ON%20THE%20FEASIBILITY%20OF%20A%20LONG-TERM%20ASPIRATIONAL%20GOAL_en.pdf [Accessed 21 June 2022].
[25] As described above, aviation emissions for flights departing LLA to destinations in the UK (domestic) and to destinations in the EEA are included within the UK ETS. Aviation emissions for flights departing LLA to destinations in the rest of the world are subject to CORSIA.
[26] CCC (2020). The 6th Carbon Budget Dataset. [online]. Available at: https://www.theccc.org.uk/publication/sixth-carbon-budget/ [Accessed 23 June 2022].

Period	2018 - 2022	2023 - 2027	2028 - 2032	2033 - 2037	2038 - 2042	2043 - 2047	2048 - 2052
Rest of world	Not included in carbon budget or UK ETS Subject to CORSIA from 26 May 2021	Not included in carbon budget or UK ETS Subject to CORSIA	Not included in carbon budget or UK ETS Subject to CORSIA	Included in carbon budget but not included in UK ETS Subject to CORSIA			

Planning policy context

5.2.10 A summary of relevant context including things that have emerged since the drafting of the 2021 ESA is given in **Table 5.2**.

Table 5.2 Policy context relevant to climate

Reference	Summary
International	
UNFCCC Glasgow Climate Pact[27]	The recent Conference of the Parties (COP 26) held in Glasgow in November 2021, resulted in almost 200 countries agreeing on: the acceleration of action on climate change this decade to reduce emissions (mitigation); helping those already impacted by climate change (adaption); enabling countries to deliver on their climate goals (finance); and working together to deliver even greater action (collaboration). This agreement is in the form of the Glasgow Climate Pact which reaffirms the long-term goal to limit global warming to 1.5°C above pre-industrial levels and resolves to pursue efforts to achieve this, recognising that limiting global warming to 1.5°C "*requires rapid, deep and sustained reductions in global greenhouse gas emissions, including reducing global CO_2 emissions by 45% by 2030 relative to the 2010 level and to net zero around mid-century, as well as deep reductions in other greenhouse gases*".
Declaration on the International Aviation Climate Ambition Coalition, 10 November 2021[28]	The inaugural meeting of the International Aviation Climate Ambition Coalition was held during COP26 in November 2021. Following this meeting a declaration was made, signed on behalf of 28 states (including the UK and USA) and committing them to "*working together, both through ICAO and other complementary cooperative initiatives, to advance ambitious actions to reduce aviation CO_2 emissions at a rate consistent with efforts to limit the global average temperature increase to 1.5°C*" and to support "*the adoption by ICAO of an ambitious long-term aspirational goal consistent with the above-referenced temperature limit, and in view of the industry's commitments towards net zero CO_2 emissions by 2050*".
National planning policies	
National Planning Policy Framework (NPPF)[29]	The NPPF, paragraph 152 states: "*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*". It also requires in paragraph 154 (b) that new development should be planned for in ways that "*can help to reduce greenhouse gas emissions, such as through its location, orientation and design.*".

[27] UNFCCC (2021). Glasgow Climate Pact. [online]. Available at: https://unfccc.int/sites/default/files/resource/cop26_auv_2f_cover_decision.pdf [Accessed 21 June 2022].
[28] UNFCCC (2021). Declaration on the International Aviation Climate Ambition Coalition, 10 November 2021. [online]. Available at: https://www.gov.uk/government/publications/cop-26-declaration-international-aviation-climate-ambition-coalition/cop-26-declaration-international-aviation-climate-ambition-coalition [Accessed 21 June 2022].
[29] MHCLG (2021). National Planning Policy Framework. [online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1005759/NPPF_July_2021.pdf [Accessed 21 June 2022].

Reference	Summary
	Furthermore, it is stated in paragraph 157, 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.*"
Net Zero Strategy: Build Back Greener[30]	This strategy sets out sectoral policies and proposals for decarbonising all sectors of the UK economy to meet the coming carbon budgets, the Nationally Determined Contribution (NDC)[31] and the net zero target by 2050. It aims to enable the delivery of the objectives set out in The Ten Point Plan for a Green Industrial Revolution[32]. In terms of aviation, the strategy is "*to become a world-leader in zero emission flight and kick-starting the commercialisation of the UK sustainable aviation fuel so people can fly, and connect without guilt. Our ambition is to enable delivery of 10% SAF by 2030 and will be supporting UK industry with £180 million funding for the development of SAF plants*".
Flightpath to the Future[23]	Published in May 2022, Flightpath to the Future provides a strategic framework for aviation over the next ten years, reiterating the aim for carbon net zero aviation by 2050. The Government position is to support airport expansion where it is justified and for the UK aviation sector to play a pioneering role in decarbonizing air travel, with "*the ultimate goal being nothing less than guilt-free zero emission flying*". The Government's plan for how the sector will reach net zero aviation – or Jet Zero – by 2050 will be detailed in the Jet Zero Strategy due later in 2022. However, Flightpath to the Future identifies the following measures that will form part of this strategy: • Increasing the efficiency of the existing UK aviation system, (aircraft, airports and airspace); • Accelerating the take up of SAF; • Developing and deploying the first generation of zero emission aircraft; • Ensuring that markets are in place to properly price carbon emissions and offset any residual emissions with greenhouse gas removals; and • Supporting consumers to be able to make the greenest choices over routes and aircraft when they choose to fly. Flightpath to the Future states clearly that the 'Airports National Policy Statement: new runway capacity and infrastructure at airports in the South East of England'[33] and 'Beyond the Horizon – The future of UK aviation: Making best use of existing runways'[34] are the most up-to-date policy on planning for airport development and that the expansion of any airport must be deliverable within the UK's climate change obligations to be able to proceed.
The Airports National Policy Statement: new runway capacity and infrastructure at airports in the South East of England[33]	This statement confirms the UK Government's policy at the time, for a proposed third runway at Heathrow. Paragraph 5.72 states "*The Climate Change Act says that the Government must "take into account" the "estimated amount of reportable emissions from international aviation for the budgetary period or periods in question" when setting carbon budgets. The Committee on Climate Change has interpreted the requirement to take these emissions into account as requiring the UK to aim to meet a 2050 target which includes these emissions, and has made its recommendations for the levels of the existing carbon budgets on this basis*".
Beyond the Horizon – The future of UK aviation: Making	Published by the Department for Transport (DfT), this document represents current UK Government policy on aviation and climate change. Paragraphs 1.8 to 1.12 clearly differentiate

[30] BEIS (2021). Net Zero Strategy: Build Back Greener. [online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1033990/net-zero-strategy-beis.pdf [Accessed 21 June 2022].
[31] BEIS (2020). The UK's Nationally Determined Contribution under the Paris Agreement. [online]. Available at: https://www.gov.uk/government/publications/the-uks-nationally-determined-contribution-communication-to-the-unfccc [Accessed 21 June 2022].
[32] HM Government (2020). The Ten Point Plan for a Green Industrial Revolution. [online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/936567/10_POINT_PLAN_BOOKLET.pdf [Accessed 21 June 2022].
[33] DfT (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/714108/airports-nps-new-runway-capacity-and-infrastructure-at-airports-in-the-south-east-of-england-print-version.pdf [Accessed 21 June 2022].

Reference	Summary
best use (MBU) of existing runways[34]	between local and national planning requirements, with carbon emissions from air traffic being a matter of national policy. In the recent Appeal Decision for Stansted, the Planning Inspector noted: "*The in-principle support for making best use of existing runways provided by MBU is a recent expression of policy by the Government. It is given in full knowledge of UK commitments to combat climate change, having been published long after the Climate Change Act 2008 (CCA) and after the international Paris Agreement*".

Local targets, budgets, and action plans

5.2.11 Luton Borough Council's Climate Action Plan[35], published in 2019 and revised in November 2021, 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 LLA is described as partner in some of the targets.

Technical and other policy guidance

5.2.12 **Table 5.3** lists guidance documents emerging since the drafting of the 2021 ESA that of potential relevance to the climate assessment.

Table 5.3 Technical guidance relevant to climate.

Guidance	Relevance
Carbon management standards and guidance	
Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance – 2nd Edition[36]	The Institute of Environmental Management and Assessment (IEMA) provides guidance on GHG emissions assessment, mitigation and reporting within an EIA context, and this is the primary source of guidance for assessing GHG emissions. The 2022 guidance further builds upon the 2017 guidance, with key changes including an emphasis on mitigation at the project outset and throughout its lifetime, and more nuanced levels of GHG emissions significance. It provides detail on the application of the five IEMA Principles on Climate Change Mitigation and EIA[37]: 1. "*The GHG emissions from all projects will contribute to climate change, the largest inter-related cumulative environmental effect.* 2. *The consequences of a changing climate have the potential to lead to significant environmental effects on all topics in the EIA Directive (e.g. human health, biodiversity, water, land use, air quality).* 3. *The UK has legally binding GHG reduction targets – EIA must therefore give due consideration to how a project will contribute to the achievement of these targets.* 4. *GHG emissions have a combined environmental effect that is approaching a scientifically defined environmental limit, as such any GHG emissions or reductions from a project might be considered to be significant.* 5. *The EIA process should, at an early stage, influence the location and design of projects to optimise GHG performance and limit likely contribution to GHG emissions.*"

[34] DfT (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 June 2022].
[35] Luton Borough Council (2019). My climate action plan: Becoming a carbon neutral borough by 2040, version 1.4. Available at: https://www.luton.gov.uk/Environment/Lists/LutonDocuments/PDF/Climate%20change/Climate-change-action-plan.pdf [Accessed 21 June 2022].
[36] IEMA (2022). Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance – 2nd Edition. [online]. Available at: https://www.iema.net/resources/blog/2022/02/24/launch-of-the-updated-eia-guidance-on-assessing-ghg-emissions [Accessed 21 June 2022].
[37] IEMA (2010). IEMA Principles Series: Climate Change Mitigation & EIA.

Guidance	Relevance
Science-Based Target Setting for the Aviation Sector[38]	Science-based targets provide defined pathways to reduce GHG emissions. Targets are considered 'science-based' if they are in line with what the latest climate science deems necessary to meet the goals of the Paris Agreement[39] – limiting global warming to well-below 2°C above pre-industrial levels and pursuing efforts to limit warming to 1.5°C. The Science-Based Target Aviation Guidance supports companies in the aviation sector to model science-based targets. This enables them to reduce their emissions footprint and prevent the worst effects of climate change.
Policy strategies and guidance	
Decarbonising Transport: A Better, Greener Britain[40]	In July 2021, the DfT published its '*Decarbonising Transport: A Better, Greener Britain*' strategy, setting out the UK Government's commitments, including: • To reach net zero for UK aviation by 2050 – already implicit with the inclusion of international aviation emissions within the Sixth Carbon Budget. • To consult on its Jet Zero strategy, which will set out the steps to reach net zero aviation emissions by 2050. • To consult on a target for UK domestic aviation to reach net zero by 2040. • To consult on a target for decarbonising emissions from airport operations in England by 2040. • To further develop the UK ETS to help accelerate aviation decarbonisation. • To aim to agree an ambitious long-term global emissions reduction goal in the ICAO by 2022.
2021 Progress Report to Parliament[41]	This CCC annual report sets out the UK's progress for 2021 against emissions reduction targets to 2050, including the UK's share of international aviation and shipping emissions as covered by the Sixth Carbon Budget[15].
Government Response to the Climate Change Committee's 2021 Progress Report to Parliament[42]	This white paper is the UK Government's response to the CCC 2021 progress report[41] and sets out policy recommendations for Government departments. This response should be read alongside the Net Zero Strategy[30], which includes the Government response to the CCC on reducing emissions.
Aviation GHGs guidance	
Sustainable Aviation[43]	Alongside all sectors, aviation has an important role to play in reducing GHG emissions. Through the Sustainable Aviation Group, UK aviation has committed to achieving net zero emissions by 2050 using an international approach. In June 2021, the Sustainable Aviation Group announced new interim decarbonisation targets of at least 15% by 2030 and 40% by 2040, and reaffirmed its commitment to net-zero by 2050[44]. Through the adoption of more fuel-efficient aircraft and operations, along with use of sustainable biofuels, the CCC has suggested that growth in the aviation sector can be compatible with the UK achieving its long-term climate change goals.

[38] SBTi (2021). Science-Based Target Setting for the Aviation Sector. [online]. Available at: https://sciencebasedtargets.org/resources/files/SBTi_AviationGuidanceAug2021.pdf [Accessed 23 June 2022].
[39] UNFCCC (2015). Paris Agreement [online]. Available at: https://unfccc.int/sites/default/files/english_paris_agreement.pdf [Accessed 23 June 2022].
[40] DfT (2021). Decarbonising Transport: A Better, Greener Britain, Department for Transport July 2021. [online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1002285/decarbonising-transport-a-better-greener-britain.pdf [Accessed 21 June 2022].
[41] CCC (2021). 2021 Progress Report to Parliament. [online]. Available at: https://www.theccc.org.uk/publication/2021-progress-report-to-parliament/ [Accessed 21 June 2022].
[42] BEIS (2021). Government Response to the Committee on Climate Change's 2021 Progress Report to Parliament. [online]. Available at: https://www.gov.uk/government/publications/committee-on-climate-changes-2021-progress-report-government-response [Accessed 21 June 2022].
[43] Sustainable Aviation Group (2022). Sustainable Aviation. [online]. Available at: https://www.sustainableaviation.co.uk/ [Accessed 21 June 2022].
[44] Sustainable Aviation Group (2021). Press Release 22 June 2021. [online]. Available at: https://www.sustainableaviation.co.uk/news/uk-aviation-industry-strengthens-commitment-to-achieving-net-zero-and-launches-first-interim-decarbonisation-targets/ [Accessed 21 June 2022].

Guidance	Relevance
International scientific reports	
Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report (AR6): Climate Change 2021 - The Physical Science Basis[45]	In August 2021 the contribution of Working Group I to AR6 was published by the IPCC. The publication reinforces the evidence presented in the previous IPCC report (AR5) and, through the utilisation of updated climate model simulations and analyses, states that "*it is unequivocal that human influence has warmed the atmosphere, ocean and land*". It is highlighted that "*global warming of 1.5°C and 2°C will be exceeded during the 21st century unless deep reductions in CO_2 and other greenhouse gas emissions occur in the coming decades*". The publication states that "*limiting human-induced global warming to a specific level requires limiting cumulative CO_2 emissions, reaching at least net zero CO_2 emissions, along with strong reductions in other greenhouse gas emissions*" and it is this assertion which will underpin the international response to global warming.
IPCC AR6: Climate Change 2022 – Mitigation of Climate Change[46]	The IPCC finalised the third part of AR6, the Working Group III contribution, in April 2022. It provides an updated global assessment of climate change mitigation progress and pledges and examines the sources of global emissions. It explains developments in emission reduction and mitigation efforts, assessing the impact of national climate pledges in relation to long-term emissions goals.
Increasing the efficiency of the existing UK aviation system	
DfT Jet Zero Strategy	Due to be published in its final form later in 2022, the Government has consulted on its Jet Zero Strategy in 2021[47,48] which had the stated aim for "*aviation to decarbonise in a way that preserves the benefits of air travel and delivers clean growth of the UK sector by maximising the opportunities that decarbonisation can bring*". The UK Government's position is that "the sector can achieve Jet Zero without the Government needing to intervene directly to limit aviation growth". The summary of responses and outcome of the Jet Zero consultation will be published later in 2022.
Aerospace Technology Institute (ATI) programme[49]	In July 2020, the UK Government announced grants of £200 million, delivered through the Aerospace Technology Institute (ATI) programme and matched by industry to create a total investment of £400 million in new research and technology to improve aircraft efficiency, including: development of high-performance engines; new wing designs; ultra-lightweight materials; energy-efficient electric components; and other brand-new concepts to enhance innovation within the sector.
Feasibility of Zero Emissions Airport Operations in England by 2040[50]	The Jet Zero consultation included a proposal for a zero-emission target for airport operations in England by 2040. Zero carbon airports are defined as having operations that do not produce GHG emissions, instead of net zero airports, which have operations that produce residual GHG emissions which are offset. A report has been prepared for the DfT considering the '*Feasibility of Zero Emissions Airport Operations in England by 2040*'.

[45] IPCC (2021). The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Masson-Delmotte, V., P. Zhai, A. Pirani, S. L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M. I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T. K. Maycock, T. Waterfield, O. Yelekçi, R. Yu and B. Zhou (eds.)]. Cambridge University Press. [online] Available at: https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_Full_Report.pdf [Accessed 21 June 2022].

[46] IPCC (2022). Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [P.R. Shukla, J. Skea, R. Slade, A. Al Khourdajie, R. van Diemen, D. McCollum, M. Pathak, S. Some, P. Vyas, R. Fradera, M. Belkacemi, A. Hasija, G. Lisboa, S. Luz, J. Malley, (eds.)]. Cambridge University Press. [online]. Available at: https://report.ipcc.ch/ar6wg3/pdf/IPCC_AR6_WGIII_FinalDraft_FullReport.pdf [Accessed 21 June 2022].

[47] DfT (2021). Jet Zero Consultation: A consultation on our strategy for net zero aviation. [online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1002154/jet-zero-consultation-a-consultation-on-our-strategy-for-net-zero-aviation.pdf [Accessed 21 June 2022].

[48] DfT (2021). Jet Zero Consultation: Evidence and Analysis. [online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1002163/jet-zero-consultation-evidence-and-analysis.pdf [Accessed 21 June 2022].

[49] BEIS (2020). News story - UK aerospace sector to benefit from £400 million funding to go green. [online]. Available at: https://www.gov.uk/government/news/uk-aerospace-sector-to-benefit-from-400-million-funding-to-go-green [Accessed 21 June 2022].

[50] Mott McDonald (2022). Feasibility of Zero Emissions Airport Operations in England by 2040. [online]. Available at: https://cp.catapult.org.uk/report/feasibility-of-zero-emissions-airport-operations-in-england-by-2040 [Accessed 23 June 2022].

Guidance	Relevance
Airspace modernisation[51]	The UK Civil Aviation Authority is developing a single coordinated implementation plan for airspace changes in the UK to cover the period to 2040, with the overall objective to deliver quicker, quieter, and cleaner journeys and more capacity for the benefit of those who use and are affected by UK airspace.
Accelerating the take up of SAF	
The Government's Response to the Renewable Transport Fuels Obligation Consultation[52]	The response outlines how new Government policies are expected to deliver additional GHG emissions savings by: • Increasing the main Renewable Transport Fuels Obligation (RTFO) target to supply renewable fuels from 9.6% to 14.6% by 2032. • Supporting recycled carbon fuels. • Expanding RTFO support to new transport modes, such as renewable hydrogen in maritime, rail and non-road transport. • Implementing updated sustainability criteria. The measures in this document will ensure that low carbon fuels continue to play a vital part in reducing GHG emissions in the years ahead.
Renewable Transport Fuel Obligations Order (RTFO)[53]	The RTFO delivers GHG reductions in transport fuels by setting annual obligations on fuel suppliers to ensure the supply of renewable transport fuel, which fuel suppliers can discharge through acquiring Renewable Transport Fuel Certificates (RTFCs). To date, the annual obligation has increased from 2.5641% in 2008 to 5.2632% from 2010 onwards. Following consultation in 2021[52], a proposed update to the RTFO would extend the scheme to include suppliers of renewable hydrogen used in fuel cell rail and non-road transport, and to renewable fuels of non-biological origin used in maritime. The new statutory instrument would also increase the RTFO obligation level to 10.2632% and update the sustainability and GHG emissions criteria that renewable fuels must meet to receive RTFCs[54,55].
Sustainable aviation fuels (SAF) mandate consultation[56]	In July 2021, the DfT issued a consultation on introducing a mandate to increase the use of SAF in aviation. SAF can be blended with jet fuel and used in existing aircraft, resulting in reduced carbon emissions with little or no change in fuelling infrastructure required at airports. The UK Government is keen to develop domestic production of SAF as a means of increasing energy security as well as generating employment and extending the lifetime of fuel refining and distribution infrastructure. If adopted (expected 2025), a SAF mandate would require jet fuel suppliers to ensure SAF uptake up to 10% by 2030 and up to 75% by 2050 with the SAF meeting a minimum GHG saving threshold of 60% compared to a jet fuel benchmark of 89 gCO_2e/MJ on a lifecycle basis.

[51] CAA (2021). Airspace modernisation update: The latest information on airspace modernization. [online]. Available at: https://www.caa.co.uk/commercial-industry/airspace/airspace-modernisation/airspace-modernisation-update/ [Accessed 21 June 2022].
[52] DfT (2021). Targeting net zero - next steps for the Renewable Transport Fuels Obligation: Government response. [online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1001880/targeting-net-zero-next-steps-for-the-renewable-transport-fuels-obligation-government-response.pdf [Accessed 23 June 2022].
[53] The Renewable Transport Fuel Obligations Order 2007. [online]. Available at: https://www.legislation.gov.uk/uksi/2007/3072/made/data.pdf [Accessed 21 June 2022].
[54] The Renewable Transport Fuel Obligations Amendment) Order 2021 (to be enacted). [online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1015511/draft-si-the-rtfo-amendment-order-2021.pdf [Accessed 21 June 2022].
[55] DfT (2021). Explanatory Memorandum to the draft Renewable Transport Fuel Obligations (amendment) order 2021. [online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1015590/em-to-the-draft-rfto-amendment-order-2021.pdf [Accessed 21 June 2022].
[56] DfT (2021). Sustainable aviation fuels (SAF) mandate consultation on reducing the greenhouse gas emissions of aviation fuels in the UK. [online]. Available at: https://www.gov.uk/government/consultations/mandating-the-use-of-sustainable-aviation-fuels-in-the-uk [Accessed 21 June 2022].

Guidance	Relevance
Green Fuels Green Skies competition[57,58]	In December 2021, under the Green Fuels Green Skies competition, eight companies were awarded funding totalling £15 million to develop first-of-a-kind production plants across the UK that pioneer new technologies to convert materials such as household waste, alcohol, carbon from the atmosphere and sewage into SAF at commercial scales.
Low carbon fuels strategy - Call for ideas[59]	In February 2022, the DfT issued a call for ideas for a low carbon fuels strategy. This document provides an up-to-date overview of the demand for and supply of low carbon fuels, the UK low carbon fuel industry and the policy context in terms of meeting challenges and driving opportunities. For Luton Airport, this includes aviation, road vehicles, rail and airside infrastructure (off-road machinery). A final strategy document is expected to be delivered in late 2022.
First generation of zero emission aircraft	
Various reports	Several reports into the future of aviation[60,61,62]. suggest that zero emission aircraft (hydrogen and electric) will enter into service from around 2035. These may be electric and hybrid electric aircraft in the short-range and <100 seat category, with hydrogen-powered single-aisle aircraft on intra-European routes.
Markets for carbon emissions and GHG removals	
Developing the UK Emissions Trading Scheme[63]	In early 2022, the UK ETS Authority consulted on developing the UK ETS addition, with the goal of being the world's first net zero consistent cap and trade market in addition to reviewing Free Allocation policy, expanding the use of emissions trading across the economy to cover waste and maritime sectors, and to incorporate GHG removal. The UK ETS is likely to be a prime market for GHG removals.
Economic research on the impacts of carbon pricing on the UK aviation sector[64]	In support of the UK ETS consultation, the UK Government commissioned research on the impacts of carbon pricing on the aviation sector. This work tested a number of policy options, concluding that under nearly all of these policy options, "*carbon emissions are projected to decrease both inside and outside UK ETS scope compared to a no UK ETS case*". Further, this work concluded that "*higher carbon prices are associated with greater reductions in demand and greater and earlier adoption of alternative technologies and fuels*".
Consultation outcome: Implementing the Carbon Offsetting and Reduction	In order to align the two mechanisms, the UK Government is consulting on the policy interface between UK ETS and CORSIA. The first round of consultation is now complete and was focussed on equivalency, to ensure UK ETS and EU ETS allowances and CORSIA offsets are all equal in terms of tCO_2e. The second round of consultation will focus on avoiding the potential for double counting. The UK Government's preferred approach is that airlines can use CORSIA

[57] DfT (2021). News story - Household waste and sewage to be used in jet fuel production as government makes world-leading sustainable aviation fuel commitments. [online]. Available at: https://www.gov.uk/government/news/household-waste-and-sewage-to-be-used-in-jet-fuel-production-as-government-makes-world-leading-sustainable-aviation-fuel-commitments [Accessed 21 June 2022].
[58] DfT (2021). Green Fuels, Green Skies (GFGS) competition: winners. [online]. Available at: https://www.gov.uk/government/publications/green-fuels-green-skies-gfgs-competition/green-fuels-green-skies-gfgs-competition-winners [Accessed 21 June 2022].
[59] DfT (2022). Low carbon fuels strategy - Call for ideas. [online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1055345/low-carbon-fuels-strategy-call-for-ideas.pdf [Accessed 21 June 2022].
[60] A Route to net zero European Aviation, Destination 2050, 2021 *available at* https://www.destination2050.eu/wp-content/uploads/2021/03/Destination2050_Report.pdf [Accessed 23 June 2022]
[61] Ten Critical Insights on The Path to A Net-Zero Aviation Sector, Mission Possible Partnership. Available at https://missionpossiblepartnership.org/wp-content/uploads/2021/10/MPP-Aviation-Transition-Strategy-2021.pdf [accessed 23 June 2022]
[62] Waypoint 2050, Air Transport Action Group, 2020. Available at https://aviationbenefits.org/media/167187/w2050_full.pdf [accessed 23 June 2022]
[63] BEIS (2022). Closed consultation - Developing the UK Emissions Trading Scheme (UK ETS). [online]. Available at: https://www.gov.uk/government/consultations/developing-the-uk-emissions-trading-scheme-uk-ets [Accessed 23 June 2022].
[64] Frontier Economics Ltd (2022). Economic research on the impacts of carbon pricing on the UK aviation sector. [online]. Available at: https://www.frontier-economics.com/media/5109/economic-research-on-the-impacts-of-carbon-pricing-on-the-uk-aviation-sector.pdf [Accessed 21 June 2022].

Guidance	Relevance
Scheme for International Aviation (CORSIA)[65]	offsets for UK origin flights to destinations outside the UK (i.e., either to the EEA or beyond) but with the equivalent number of allowances then removed from the UK ETS Register. This approach would provide airlines with the flexibility to use either UK ETS allowances or CORSIA offsets while also enabling the UK Government to limit carbon emissions and adhere to national commitments towards carbon net zero in 2050.
Supporting consumers to be make the greenest choices	
Carbon offsetting in transport	In July 2019, the DfT issued a call for evidence "*seeking views and evidence on the role that greater consumer information and carbon offsetting can play in mitigating emissions from ticketed travel across all transport modes such as train travel, bus and coach travel, flights and ferries*"[66]. The type of information suggested in the consultation document included: CO_2 emissions produced per passenger for an individual journey; and information on the level of CO_2 emissions produced by different models / ages of aircraft. In reporting the outcome of this consultation, the DfT noted overall agreement that more consumer information should be provided and further noted the wide range in views on what information should be provided and how effective this would be, either changing consumer behaviour or having no impact[67].

5.3 Future baseline

5.3.1 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 5.5**.

5.3.2 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).

5.3.3 As a representation of the future baseline, emissions from the 'without development' central emission scenario are shown in **Table 5.4**. 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 5.5**. Equivalent representations for future baseline under the upper and lower emission scenarios are described in **Appendix 5A**.

Table 5.4 GHG emissions/year for the 18 mppa future baseline in the 'without development' case for the central emission scenario.

Source	Activity	2025 ($ktCO_2e$ / yr*)	2028 ($ktCO_2e$ / yr*)	2032 ($ktCO_2e$ / yr*)	2040 ($ktCO_2e$ / yr*)	2050 ($ktCO_2e$ / yr*)
Aviation	Domestic aviation	39.81	38.84	37.01	35.07	27.86
	EEA Aviation	823.61	781.15	757.43	717.80	570.16

[65] DfT (2021). Consultation outcome: Implementing the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA). [online]. Available at: https://www.gov.uk/government/consultations/implementing-the-carbon-offsetting-and-reduction-scheme-for-international-aviation/implementing-the-carbon-offsetting-and-reduction-scheme-for-international-aviation-corsia [Accessed 23 June 2022].

[66] DfT (2019). Carbon offsetting in transport - a call for evidence. [online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/822659/call-for-evidence-carbon-offsetting.pdf [Accessed 21 June 2022].

[67] DfT (2021). Consultation outcome - Carbon offsetting in transport: government response. [online]. Available at: https://www.gov.uk/government/consultations/carbon-offsetting-in-transport-a-call-for-evidence/outcome/carbon-offsetting-in-transport-government-response [Accessed 21 June 2022].

Source	Activity	2025 ($ktCO_2e$ / yr*)	2028 ($ktCO_2e$ / yr*)	2032 ($ktCO_2e$ / yr*)	2040 ($ktCO_2e$ / yr*)	2050 ($ktCO_2e$ / yr*)
	Rest of World Aviation	183.37	168.38	163.90	155.32	123.38
Surface access	Passengers	276.94	253.80	215.83	125.05	69.23
	Employees	8.45	7.92	6.83	4.05	2.36
Airport buildings and ground operations	Grid electricity	5.77	3.65	3.35	2.67	2.67
	Gas usage	1.49	1.49	1.49	1.49	1.49
	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)	1.05	1.05	1.05	1.05	1.05
	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		1,341.63	1,257.42	1,188.03	1,043.65	799.35

* emissions are quoted in units $ktCO_2e$/yr unless otherwise stated for aviation emissions which are reported in $ktCO_2$/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.
The results reported are emissions only and do not include the effects of carbon offsetting or carbon removals.

5.4 Assessment methodology

5.4.1 This section details some minor changes in the assessment methodology from the 2021 ESA that affect the results presented here.

Aviation emission factors

5.4.2 As in the 2021 ESA, Emission factors were derived from the EMEP/EEA guidebook[68]. The EEA and the United Nations (UN's) Long-Range Transboundary Air Pollution project (LRTAP) produce the guidebook to support the compilation of GHG inventories across Europe and across market sectors. The aviation chapter of the guidebook recommends methodologies for calculating GHG emissions from aviation, with various "tiers" or levels of accuracy. The Tier 3A approach has been used for this work, since it provides the best level of accuracy consistent with the availability of data. Specifically, it uses data on aircraft type and origin/destination.

5.4.3 The Tier 3A method takes into account that emission rates vary between phases of flight, and consequently that fuel burn is related to flight distance, but not in a simple way because different flight lengths entail different times in the various phases such as CCD.

5.4.4 EMEP/EEA provides two spreadsheets for calculating emissions, one for the Landing and Take-Off (LTO) phase and one for the Climb, Cruise and Descent (CCD) phase. The underlying methodologies behind these spreadsheets are briefly described in the main guidebook document, with more detail available in a supporting document. The spreadsheet embodies a set of factors derived by using Eurocontrol's Advanced Emissions Model (AEM) tool. In an update to the methodology, the EMEP/EEA spreadsheet for calculating emissions for the LTO phase, was used for the assessment.

[68] EMEP/EEA air pollutant emission inventory guidebook (2019). Chapter 1.A.3.a Aviation, [online]. Available at: https://www.eea.europa.eu/publications/emep-eea-guidebook-2019 [Accessed June 2022].

Sustainable aviation fuel

5.4.5 Assumptions on the uptake of SAF and the life-cycle emission reduction have been updated for the central, upper and lower emission scenarios in accordance with the DfT Jet Zero consultation and DfT consultation on introducing a mandate to increase the use of SAF in aviation. The 2050 assumptions are shown in **Table 5.5**.

Table 5.5 SAF Assumptions

Assessment	Upper Emission Scenario	Central Emission Scenario	Lower Emission Scenario
2021 ESA	2024, 2028, 2032, 2040 0% implementation 2050 5% implementation 50% life-cycle emission reduction	2024, 2028, 2032, 2040 0% implementation 2050 10% implementation 30-47% life-cycle emission reduction	2024, 2028, 2032, 2040 0% implementation 2050 18% implementation 60% life-cycle emission reduction
2022 ESA	2025 0% implementation 2028 1% implementation 10% life-cycle emission reduction 2032 2% implementation 10% life-cycle emission reduction 2040 3% implementation 10% life-cycle emission reduction 2050 5% implementation[1] 10% life-cycle emission reduction[2]	2025 0% implementation 2028 3% implementation 60% life-cycle emission reduction 2032 6% implementation 60% life-cycle emission reduction 2040 13% implementation 60% life-cycle emission reduction 2050 30% implementation[3] 60% life-cycle emission reduction[4]	2025 0% implementation 2028 7% implementation 60% life-cycle emission reduction 2032 14% implementation 60% life-cycle emission reduction 2040 31% implementation 60% life-cycle emission reduction 2050 75% implementation[5] 100% life-cycle emission reduction[6]

[1]DfT Jet Zero Consultation: BAU scenario
[2]SAF mandate consultation; see Table p37
[3]DfT Jet Zero Consultation: High Ambition scenario
[4]SAF mandate consultation, para 3.34
[5]SAF mandate consultation; see Table p41, Scenario E
[6]Assumes 100% power to liquid, nuclear electricity

Evaluation of significance

5.4.6 The IEMA guidance on GHG emissions assessment, mitigation and reporting within an EIA context has been used in the evaluation of significance. The 2022 IEMA guidance[36] further builds upon the 2017 guidance, with key changes including an emphasis on mitigation at the project outset and throughout its lifetime, and more nuanced levels of GHG emissions significance.

5.4.7 Current IEMA guidance states that:

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

5.4.8 The significance of the GHG emissions from the Proposed Scheme is determined based on the criteria in **Table 5.6** developed from the revised IEMA guidance. Major or moderate adverse effects

and beneficial effects are considered to be significant. Minor adverse and negligible effects are not considered to be significant.

Table 5.6 Significance criteria

Significance	Significance criteria
Major adverse	The Proposed Scheme does not make a meaningful contribution to the UK Government meeting its carbon budgets / targets. Adverse GHG impacts are not mitigated / do-minimum and are not compliant with requirements of national, regional and local policy.
Moderate adverse	The Proposed Scheme falls short of fully contributing to the UK Government meeting its carbon budgets / targets. Adverse GHG impacts are partially mitigated and partially meet the requirements of national, regional and local policy.
Minor adverse	The Proposed Scheme is fully in line with the trajectory of the UK Government meeting its carbon budgets / targets. Adverse GHG impacts are mitigated with good practice design standards and meet the requirements of national, regional and local policy.
Negligible	The Proposed Scheme has minimal residual GHG emissions and is 'ahead of the curve' for the trajectory of the UK Government meeting its carbon budgets / targets. GHG impacts are mitigated through measures that go beyond good practice design standards and the requirements of national, regional and local policy.
Beneficial	The Proposed Scheme has net GHG emissions below zero, causing a direct or indirect reduction in atmospheric GHG emissions which has a positive impact on the UK Government meeting its carbon budgets / targets.

5.4.9 Emissions have now also been contextualised against the Sixth Carbon Budget[15].

5.5 Quantification of GHG emissions

Total emissions

5.5.1 Projected GHG emissions for the baseline case, 'without development' and 'with development' cases for the assessment years 2025, 2028, 2032, 2040 and 2050 in three future scenarios (upper emission, central emission, and lower emission scenarios) are shown in **Table 5.7**.

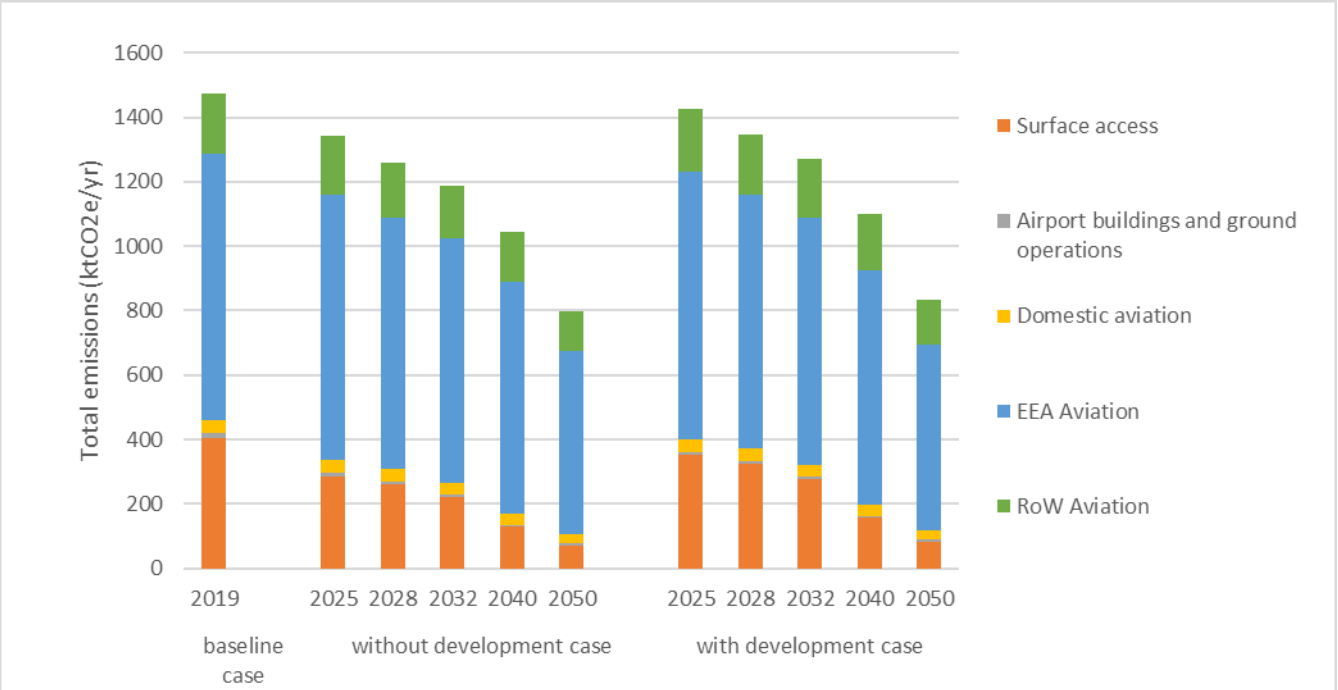
Table 5.7 Total GHG emissions ($ktCO_{2e}/yr$) in the 2019 baseline, 'without development' and 'with development' cases in the upper, central and lower emission scenarios.

		2025		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		1348.3	1431.7	1286.8	1377.1	1253.1	1341.5	1218.9	1298.0	1119.9	1191.3
Central emission scenario	1478.3	1341.6	1425.1	1257.4	1347.2	1188.0	1271.5	1043.6	1099.1	799.3	833.0
Lower emission scenario		1326.3	1407.6	1191.5	1271.9	1053.7	1115.8	841.3	872.8	243.1	251.8

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.
The results reported are emissions only and do not include the effects of carbon offsetting or carbon removals.

5.5.2 A breakdown of total projected GHG emissions by source for the central emission scenario are shown in **Figure 5.1**. 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 5A**. A summary of the results is provided below.

Figure 5.1 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 CO_2 emissions[69]. This reflects the uncertainties associated with non-CO_2 emissions (see **Section 7.9 of 2021 ESA**). 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 CO_2 is reported with a global warming potential of one, 1 tonne of CO_2 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.
The results reported are emissions only and do not include the effects of carbon offsetting or carbon removals.

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

5.5.4 In 2050, total GHG emissions from the 'with development' case are 645.3 $ktCO_2e/yr$ (44%) lower than the 2019 baseline case. In the higher emissions scenario total emissions are 287.1 $ktCO_2e/yr$ lower. In the Lower Emissions scenario. total emissions are 1,226.6 $ktCO_2e/yr$ lower). This range represents a 19 – 83% reduction in total GHG emissions relative to the 2019 baseline.

5.5.5 GHG emissions in the 'with development' case peak in the 2025 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 2025 while efficiency improvements continue. At their peak in 2025, total GHG emissions associated with the 'with development' case are 47 – 71 $ktCO_{2e}/yr$ lower than the 2019 baseline, dependent on the future scenario considered.

[69] 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

5.5.6 Aviation GHG emissions in the 'with development' case for the assessment years 2025, 2028, 2032, 2040 and 2050 are lower than the 2019 baseline (in the upper, central, and lower emission scenarios). This is because the fleet composition includes the latest generation of aircraft. '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. 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.

5.5.7 In 2050, total aviation GHG emissions in the 'with development' case are 743.1 $ktCO_2/yr$ in the central scenario, a decrease of 309.7 $ktCO_2/yr$, or 29%, from the 2019 baseline. When considering the upper and lower scenarios, the reduction ranges between 104.4 and 844.8 $ktCO_2/yr$, equivalent to a 10 – 80% decrease in total aviation GHG emissions depending on the scenario considered

5.5.8 In 2032, international aviation emissions would be 950.2 $ktCO_{2e}/yr$ in the central scenario, ranging from 889.5 to 998.6 $ktCO_{2e}/yr$ for the lower and upper scenarios. This is equivalent to 2.5% (2.4 – 2.7 %) of the 37.5 $MtCO_2e$ planning assumption.

5.5.9 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 SAF. The introduction of zero emission aircraft (electric and hydrogen) into the fleet has not been accounted for in this assessment.

Surface access emissions

5.5.10 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 that have been embedded into the GHG assessment.

5.5.11 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 83.2 $ktCO_{2e}/yr$ in the central scenario and in the range 34.0 – 229.4 $ktCO_{2e}/yr$. This represents a 322.6 $ktCO_{2e}/yr$ (176.4 – 371.8 $ktCO_{2e}/yr$) reduction relative to the 2019 baseline, equivalent to a 79.6% (43.4% - 91.6%) reduction in surface access GHG emissions. The difference between the scenarios is due to the relative lack of low/zero carbon vehicles in the upper emissions scenario.

Airport buildings and ground operations

5.5.12 Both location-based and market-based carbon reporting methods have been used to calculate projected GHG emissions associated with Scope 2 electricity. 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.

5.5.13 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, subject to post-COVID-19

recovery in passenger levels, and to generate at least 25% of electricity demand from on-site renewables by 2026.

5.5.14 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, which has been achieved.

5.5.15 Using the location-based method, in 2050, airport building and ground operation GHG emissions from the 'with development' case are 6.71 $ktCO_{2e}/yr$ in the central scenario and in the (upper and lower scenarios) range of 3.75 – 7.43 $ktCO_{2e}/yr$. Using the market-based method, in 2050, airport building and ground operation GHG emissions from the 'with development' case are 4.24 $ktCO_{2e}/yr$ in the central scenario.

5.5.16 A summary of the reductions predicted in 2050 relative to the 2019 baseline are presented in **Table 5.8**. In all cases and for all emission categories, emissions are expected to reduce by 2050. In total, emissions are expected to reduce by 44-46% for the two central scenarios and by up to 83-84% in the lower emission scenario.

Table 5.8 Summary of emission reductions by 2050

	% reduction by 2050 (without development)		% reduction by 2050 (with development)	
Emission category	**Central scenario**	**Range**	**Central scenario**	**Range**
Aviation	31%	12%-80%	29%	10%-80%
Surface access	82%	54%-92%	79%	43%-92%
Airport buildings and ground operations	54%	49%-74%	51%	46%-73%
Total	46%	24%-84%	44%	19%-83%

5.6 Assessment of effects: the global climate

5.6.1 The only receptor for the climate assessment is the global climate, which is a highly sensitive receptor. All increases in GHG emissions to the atmosphere are considered negative, direct, and permanent effects.

5.6.2 The magnitude of the GHG emissions from the Proposed Scheme is assessed based on the tests described in **Methodology for assessing overall effect of GHG emissions associated with the Proposed Scheme** of the 2021 ESA and updates presented in **Section 5.4**.

5.6.3 The assessment of effects considers emission source categories separately, reflecting how international aviation is accounted for in the context of the first five carbon budgets and the differentiation made in MBU that aviation emissions are subject to national policy, and non-aviation emissions are subject to both local and national planning policy. A further differentiation is made between domestic, EEA and rest of the world aviation emissions, reflecting the role of the UK ETS and CORSIA.

International aviation GHG emissions from the Proposed Scheme

5.6.4 This sub-section considers the extent to which the scheme materially affects the ability of the UK to meet the aviation 'planning assumption'. The scale of change in international aviation GHG

emissions is contextualised against the current UK 'planning assumption' for international aviation of 37.5 $MtCO_2$.

5.6.5 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.

5.6.6 In 2025 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 17ktCO_2, which represents 0.05% of the 37.5 $MtCO_2$/yr planning assumption. By 2032 international aviation GHG emissions associated with the Proposed Scheme are predicted to be 0.07 – 0.08% of the planning assumption. It is very unlikely that the Proposed Scheme will materially affect the ability of the UK to meet the 37.5 $MtCO_2$/yr 'planning assumption', noting that 81% of these international emissions are included within the UK ETS cap in 2025.

5.6.7 The projected incremental increase in 2050 emissions at Luton airport can be compared with and considered alongside recent planning applications at other UK airports in **Table 5.9**. The incremental increase in emissions as a percentage of the planning assumption that is identified in 'Making Best Use of existing runways' of 37.5 $MtCO_2$/vr is in the range 0.048% – 0.320% (0.018 to 0.12 $MtCO_2$/yr) for individual airports, with the Proposed Scheme being at the lower end of this range. If approval is granted for all five of these airports, the incremental increase in 2050 would be in the range 0.58% - 0.83%.

5.6.8 The incremental increase in emissions from the Proposed Scheme is within the range of incremental increases at other airports. The cumulative incremental increase in emissions from the Proposed Scheme and from these other airports would be less than 1% of the planning assumption if it was applied in 2050 and less than 2% of the planning application if applied in 2032 (assuming a reduction in aviation emissions between 2032 and 2050 of around a third). 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.

Table 5.9 Assessment of significance: aviation emissions and recent airport planning applications

Airport	Passenger growth	2050 total aviation emissions (Proposed Development) $MtCO_2$/yr	2050 incremental increase in aviation emissions $MtCO_2$/yr	Increase in aviation emissions as a % of 37.5 $MtCO_2$ planning assumption	Status
London Stansted	8 mppa (from 35 to 43 mppa)	1.13 – 1.86	0.07 – 0.12	0.187 – 0.320	Approved with 43 mppa cap (subject to Section 106 Agreement).
Southampton International	1mppa (from 2 to 3mppa)	0.367	Cannot be determined	Cannot be determined	Approved with 3 mppa cap (subject to Section 106 Agreement).
Leeds Bradford	3mppa (c. 4 to 7mppa)	0.22 – 0.30	0.062 - 0.093	0.165 - 0.248	Conditional approval
Bristol	2mppa (from 10 to 12mppa)	0.413 – 0.488	0.066 – 0.078	0.176 – 0.208	Approved with 12 mppa cap (subject to Section 106 Agreement).
London Luton	1mppa (from 18 to 19mppa)	0.720 – 0.848	0.018 - 0.021	0.048 – 0.056	Pending

UK carbon net zero target for 2050 and UK carbon budgets

5.6.9 This sub-section considers the extent to which the scheme affects the ability of the UK to meet its target and budgets. The scale of change in GHG emissions from all is contextualised against the UK Government's UK carbon budgets[12] (see **Table 5.1**).

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

- Airport buildings and ground operations;
- Surface access;
- Domestic aviation (LTO and CCD) phases); and
- International (EEA and Rest of World) aviation (LTO and CCD phases) for the Sixth Carbon Budget onwards.

5.6.11 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. **Table 5.10** presents the net $ktCO_2e$ associated with the Proposed Scheme during each of the legislated Carbon Budget periods. Emissions from Luton Airport would represent 0.02% of the fourth carbon budget, increasing to 0.02-0.03% of the fifth carbon budget and 0.04% of the sixth carbon budget. Although these percentages increase, reflecting the signification reductions in successive carbon budgets, they remain extremely small. It is considered very unlikely that the Proposed Scheme will materially affect the ability of the UK to meet the Carbon Budgets.

Table 5.10 Estimated GHG emissions from the Central Emissions Scenario contextualised against the relevant UK Carbon Budgets.

	4th (2023 to 2027) 1,950,000	5th (2028 to 2032) 1,725,000	6th (2033 to 2037) 965,000	2050 net zero target (2050 only) Net zero
Proposed Scheme GHG emissions per relevant carbon budget ($ktCO_2e$)	417.5	417.5-449.0	417.5	33.7
Proposed Scheme GHG emissions as a percentage of relevant carbon budget	**0.02%**	**0.02%-0.03%**	**0.04%**	-

Local objectives

5.6.12 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 Scheme affects the ability of Luton Borough Council to meet its climate change objectives for a carbon neutral area by 2040[35] is taken into account. However, as the local objectives are not yet part of local planning policy, they are given less weight[12] than the national Net Zero target[12] and the associated budgets in this magnitude test.

5.6.13 The Luton Borough Council Climate Change Action Plan[35] 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 in the Central emission scenario are 55.5 $ktCO_2e/yr$. The scale of GHG emissions from the Proposed Scheme are such that

they are considered unlikely to affect the ability of Luton Borough Council to meet its carbon neutral borough aim.

Consideration of sensitivity - Condition 10 noise contour limit compliant future baseline

5.6.14 As stated in **Section 3.2**, and **Chapter 6: Noise**, the noise assessment has used a future baseline against which the Proposed Scheme is assessed that is compliant with the Condition 10 noise contour limit (area enclosed by the 57dB(A) Leq16hr (0700-2300) contour shall not exceed 19.4 sq km for daytime noise, and the area enclosed by the 48dB(A) Leq8hr (2300-0700) contour shall not exceed 37.2 sq km for night-time noise). The 2019 scenario of air traffic movements equivalent to 18mppa was not used in the noise assessment as the noise limits imposed by Condition 10 were exceeded during that year.

5.6.15 In terms of GHG emissions, a Condition 10 compliant future 'without development baseline in 2025 would have around 5% fewer flights than the 18mppa future 'without development baseline in 2025. At some point between 2025 and 2028 the introduction of new, quieter aircraft, would be sufficient to comply with the Condition 10 noise limit with air traffic movements equivalent to 18 mppa.

5.6.16 As a sensitivity test for the assessment of GHG emissions, we have considered a 2025 'without development baseline scenario that is compliant with the Condition 10 noise limit with reference to the 2025 'with development' scenario, i.e. the Proposed Scheme.

5.6.17 Reducing the emissions for the 2025 'without development' case by 5% would result in the impact of the Proposed Scheme increasing by 0.18% (67-68 $ktCO_2$), in the context of the 37.5 $MtCO_2$/yr planning assumption, and increasing by around 452 $ktCO_2$ in the fourth Carbon Budget period (2023-2027), which is 0.02% of the budget. Therefore, when using the Condition 10 compliant future baseline in 2025 the conclusion is maintained that it is highly unlikely that the Proposed Scheme will materially affect the ability of the UK to meet the various GHG targets in this period.

5.6.18 This sensitivity test is for a temporary effect and does not change the conclusions for climate change impact reached in the 2021 ESA

5.7 Conclusions

5.7.1 This assessment of GHG emissions has been undertaken in accordance with best practice, providing emission calculations for each source category associated with airports and using central, low and high emission scenarios reflecting policy ambitions to reduce GHG emissions in the UK and internationally. With reference to MBU, we have considered the significance of aviation emissions with reference to national policies and non-aviation emissions with reference to local and national policies. The assessment of aviation emissions further requires consideration of the year of assessment and whether the proportion of international aviation emissions is included as a 'planning assumption' or is included within the UK carbon budget.

5.7.2 For international aviation GHG emissions, at its peak in 2032, the 'share' of the UK planning assumption of 37.5 $MtCO_2$/yr from the Proposed Scheme is only 0.07-0.08% 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 $MtCO_2$/yr planning assumption.

5.7.3 From 2033 onwards when international aviation is included in the UK Carbon Budgets, the scale of GHG emissions associated with the Proposed Scheme are such that they align with the trajectory of the UK Government meeting its Carbon Budgets and 2050 net zero target.

5.7.4 The residual GHG emissions from airport buildings and operations assessment and journeys to and from the Airport will require further mitigations or offsetting by use of carbon reduction projects. LLAOL has committed to work with Government, LBC, and other stakeholders to develop their approach to becoming a net zero airport by 2040 and will continue to monitor, report and review targets beyond 2025 through annual corporate reporting. A majority of the residual GHG emissions are Scope 3 emissions and are therefore not controlled by LLAOL. Government and industry action will drive reductions in these emissions.

5.7.5 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 Carbon Reduction Plan was submitted in 2021 and final version is currently in preparation. Further details are described in **Section 7.13** of the 2021 ESA.

5.7.6 On the basis of the commitment to produce a Carbon Reduction Plan, adverse GHG impacts will be mitigated with good practice design standards and meet the requirements of national, regional, and local policy.

5.7.7 The updated assessment shows that the conclusions of the 2021 ES Addendum remain valid. The Proposed Scheme is considered to have **a low GHG emissions magnitude** and the overall effect of GHGs associated with the Proposed Scheme on the global climate is considered **minor adverse,** and therefore **not significant** in accordance with the IEMA guidance[36] for defining significance.

6. Noise

6.1 Introduction

6.1.1 **Chapter 8: Noise** of the 2021 ES Addendum (2021 ESA) as amended in the standalone **Update to Volume 2 Noise Chapter (41431RR20V3NA)** (July 2021 ESA as amended) concluded that the Proposed Scheme would result in a significant effect at 1,877 residences, being those experiencing noise above the Significant Observable Adverse Effect Level with at least a 1 dB increase in noise. In addition, significant effects were identified at non-residential receptors at Addington, Park Town in Luton, Breachwood Green, St Pauls Walden, Slip End and Stevenage.

6.1.2 This chapter of the ES Addendum provides an update to the results for the operational noise assessment of changes to Condition 8 and Condition 10. The year in which 19 mppa is forecast to be reached has changed from 2024 to 2025. Where paragraphs or whole sections of the 2021 ESA have not been included in this addendum it is because there have been no changes to that part of the document and reference can be made to the original. Appendix numbering has remained consistent with the 2021 ESA as amended even though some appendices are not included for the reason that they have not changed.

6.1.3 The varied form of Condition 10 that is sought by this s73 Application (see **paragraph 2.2.1** for the rationale), based upon forecast flows, is as follows:

The area enclosed by the 57dB(A) Leq16hr (0700-2300) contour shall not exceed 21.1 sq km for daytime noise, and the area enclosed by the 48dB(A) Leq8hr (2300-0700) contour shall not exceed 42.1 sq km for night-time noise, when calculated by the Federal Aviation 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.

Post 2030 the area enclosed by the 57dB(A) Leq16hr (0700-2300) contour shall not exceed 15.1 sq km for daytime noise, and the area enclosed by the 48dB(A) Leq8hr (2300-0700) contour shall not exceed 31.6 sq km for night time noise.

6.2 Data gathering methodology

6.2.1 The approach to the computer noise modelling has been undertaken in the same way as the 2021 ES Addendum as amended but using updated forecasts, assessment years, and population data. The updated forecasts for each of the assessed years is presented in **Appendix 8B** in **Volume 3: Figures and Appendices**, with the updated modelling methodology presented in **Appendix 8C**. The numbering of the appendices supporting this noise chapter has been retained to replicate the numbering used in the standalone **Update to Volume 2 Noise Chapter (41431RR20V3NA)** (July 2021). This is to enable side-by-side comparison with the updated appendices.

6.2.2 The population data used for the population and dwelling counts within the computer noise modelling has been updated with more recent population data for 2021, supplied under licence for this Proposed Scheme by CACI Limited.

6.3 Scope of the assessment

Temporal scope

6.3.1 The years of assessment for this addendum are 2023 and 2024 for passenger numbers above 18mppa, 2025 being the first year of 19mppa, 2028 and then 2031, when the existing Condition 10 limits would come back into effect.

6.3.2 The baseline for this 2022 ES Addendum is based upon the existing Condition 10 limits. In the 2021 ES Addendum, this baseline was formed by adjusting the 2019 actual flows so that the resultant km^2 area within the noise contours matched the existing Condition 10 limits. This approach was considered robust for the assessment, because this would provide the key parameters for the assessment of noise (i.e. dwellings, population and area for the $L_{Aeq\ 16\ hour}$ daytime and $L_{Aeq,\ 8\ hour}$ night-time noise contours). However, it is understood that this baseline was not based on a calculated ATM schedule and was therefore abstract and potentially confusing. For this addendum, the baseline has been updated based on the ATMs that would meet the Condition 10 limits and taking into account the fleet mix of the year of assessment (whether 2023, 2024 or 2025). This updated approach provides a baseline substantiated with predicted flows, albeit ones which would be difficult for the airlines to operate in practice. The resultant baseline years for comparison are as follows:

- the area extent of the existing Condition 10 for 2021 to 2027 inclusive, based on 2023 fleet mix, which provides a noise limit for airport 'in-air' operation;
- the area extent of the existing Condition 10 for 2021 to 2027 inclusive, based on 2024 fleet mix, which provides a noise limit for airport 'in-air' operation;
- the area extent of the existing Condition 10 for 2021 to 2027 inclusive, based on 2025 fleet mix, which provides a noise limit for airport 'in-air' operation;
- the area 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 12.4 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.

6.4 Assessment methodology

Assessment scenarios

6.4.1 Aviation noise described using the L_{Aeq} metric has been assessed using the following scenarios as discussed in **Section 6.5**:

- A comparison between 'with Proposed Scheme' in 2023 (forecast to be at 18+mppa) and 'without Proposed Scheme' in 2023;
- A comparison between 'with Proposed Scheme' in 2024 (forecast to be at 18+mppa) and 'without Proposed Scheme' in 2024;
- A comparison between 'with Proposed Scheme' in 2025 (forecast to be at 19mpppa) and 'without Proposed Scheme' in 2025;
- A comparison between 'with Proposed Scheme' in 2028 and 'without Proposed Scheme' in 2028;

- A comparison between the 'with Proposed Scheme' in 2028 and 'without Proposed Scheme' as had been expected under the 2014 Planning Permission's ES (as assessed in the 2012 ES); and
- A comparison of the 'with Proposed Scheme' in 2031 as compared with the 'without Proposed Scheme in 2031.

N-Contours

6.4.2 The N65 and N60 contours have been updated for both the current limit contours of the existing Condition 10 and the proposed Condition 10 limit contours, both in the short-term (as identified for the 2023 forecasts) and the long-term (as identified for the 2028 forecasts). The results of the N contours analysis is presented in **Appendix 8G** in **Volume 3: Figures and Appendices**.

LA_{max} Assessment

6.4.3 Recent exceedances of Condition 10 (based on the $L_{Aeq,\ 16\ hour}$ and $L_{Aeq,\ 8\ hour}$) at 18mppa do not involve any exceedance of the L_{Amax} metric. Accordingly, the L_{Amax} assessment considers the19 mppa scenarios. The L_{Amax} assessment compares the 19 mppa scenario in 2025 with the ATMs that would occur under the existing Condition 10 limit based on the forecasted 2025 fleet mix and the 19 mppa scenario in 2028 with the equivalent 18 mppa scenario for 2028 under the existing Condition 10 limit.

6.4.4 The assessment of effects from maximum noise levels of aircraft movements have been updated in **Appendix 8F** in **Volume 3: Figures and Appendices.**

6.5 Assessment of noise effects

Residential L_{Aeq} noise contour assessment

6.5.1 This section presents a discussion of the results, presented in full in **Appendix 8E** in **Volume 3: Figures and Appendices**, used to identify noise effects for the operation of LLA.

General Comments

6.5.2 **Table 6.1** below summarises the results providing the numbers of dwellings that would experience noise above the lowest observed adverse effect level (LOAEL), the 54 dB $L_{Aeq,\ 16hr}$ contour (the onset of significant annoyance) and significant observed adverse effect level (SOAEL) for the various baseline and Proposed Scheme scenarios. **Table 6.2** below sets out the difference between the key assessment years.

6.5.3 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 2028 future baseline updated scenario when the Airport would be operating 12.4 mppa. By 2031 there are less dwellings above SOAEL and the level identified with the onset of significant annoyance with the Proposed Scheme than with the 18 mppa baseline.

6.5.4 The year in which the greatest number of additional dwellings experience noise above SOAEL is 2023, when in comparison with the existing Condition 10 limits, 105 additional dwellings would be predicted to experience noise above SOAEL during the daytime and 322 additional dwellings during the night-time with the Proposed Scheme. The number of additional dwellings above the night-time SOAEL remains constant until 2023 but then decreases thereafter.

6.5.5 No dwellings are predicted to be within the noise contour for UAEL for either daytime or night-time in any scenario.

Table 6.1 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									
	2023 current Condition 10 noise contour	2024 current Condition 10 noise contour	2025 current Condition 10 noise contour	2023 Proposed Scheme 18 mppa noise contour	2024 Proposed Scheme 18 mppa noise contour	2025 19 mppa noise contour	Existing future Condition 10 noise contour (2028 onwards)	12.4 mppa future baseline 2028 noise contour	2028 19 mppa noise contour	2031 19 mppa noise contour
Daytime contour level ($L_{Aeq,16hr}$)										
51	14227	14551	14530	16282	15427	14530	9876	9788	10226	9558
54	7168	7172	7184	7736	7532	7184	5452	5456	5632	5325
63	639	639	639	744	688	639	359	282	399	359
Night-time contour level (LAeq,8hr)										
45	19589	19617	19608	24602	24518	22190	15488	16626	19438	16591
55	1671	1671	1671	1993	1993	1840	1057	1483	1428	968

Table 6.2 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					
	2023 Proposed Scheme 18 mppa increase on existing Condition 10 noise contour	2024 Proposed Scheme 18 mppa increase on existing Condition 10 noise contour	2025 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 12.4 mppa future baseline 2028	2031 19mppa noise contour increase on existing future Condition 10 noise contour
Daytime contour level ($L_{Aeq,16hr}$)						
51	2055	876	0	350	668	-318
54	568	360	0	180	176	-127
63	105	49	0	40	117	0
Night-time contour level (LAeq,8hr)						
45	5013	4901	2582	3950	2812	1103
55	322	322	169	371	-55	-89

Comparison of noise change

6.5.6 **Table 6.3** to **Table 6.14** below show how the difference in number of dwellings between the Proposed Scheme scenarios and baseline scenarios relate to different noise contours to enable more detailed assessment to be undertaken.

Table 6.3 Number of dwellings by change of daytime noise level (dB), per noise contour ($L_{Aeq,T}$ dB), as a result of comparing the 2023 Proposed Scheme with the existing Condition 10 noise limits for 2023

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 -0.1**	**0.0 to 0.9**	**1.0 to 1.9**	**2 to 2.9.0**	**>=3**
51.0 to 51.9	0	0	0	0	4,106	0	0	0
52.0 to 52.9	0	0	0	0	2,844	0	0	0
53.0 to 53.9	0	0	0	0	1,596	0	0	0
54.0 to 54.9	0	0	0	0	957	0	0	0
55.0 to 55.9	0	0	0	0	1,288	0	0	0
56.0 to 56.9	0	0	0	0	777	0	0	0
57.0 to 57.9	0	0	0	0	664	0	0	0
58.0 to 58.9	0	0	0	0	735	0	0	0
59.0 to 59.9	0	0	0	0	860	0	0	0
60.0 to 60.9	0	0	0	0	718	0	0	0
61.0 to 61.9	0	0	0	0	565	0	0	0
62.0 to 62.9	0	0	0	0	428	0	0	0
63.0 to 63.9	0	0	0	0	178	0	0	0
64.0 to 64.9	0	0	0	0	219	0	0	0
65.0 to 65.9	0	0	0	0	338	0	0	0
66.0 to 66.9	0	0	0	0	2	0	0	0
67.0 to 67.9	0	0	0	0	0	0	0	0
68.0 to 68.9	0	0	0	0	7	0	0	0

6.5.7 When comparing the operation of the Airport in 2023 in the daytime with the Proposed Scheme in operation as compared with the operation of the Airport under the existing consent , 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 6.4 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 Proposed Scheme with the existing Condition 10 noise limits for 2023

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 -0.1**	**0.0 to 0.9**	**1.0 to 1.9**	**2 to 2.9.0**	**>=3**
45.0 to 45.9	0	0	0	0	6,109	0	0	0
46.0 to 46.9	0	0	0	0	5,752	0	0	0
47.0 to 47.9	0	0	0	0	3,610	0	0	0
48.0 to 48.9	0	0	0	0	1,637	0	0	0
49.0 to 49.9	0	0	0	0	1,130	0	0	0
50.0 to 50.9	0	0	0	0	1,142	0	0	0
51.0 to 51.9	0	0	0	0	762	0	0	0
52.0 to 52.9	0	0	0	0	732	0	0	0
53.0 to 53.9	0	0	0	0	813	0	0	0
54.0 to 54.9	0	0	0	0	922	0	0	0
55.0 to 55.9	0	0	0	0	536	0	0	0
56.0 to 56.9	0	0	0	0	565	0	0	0
57.0 to 57.9	0	0	0	0	257	0	0	0
58.0 to 58.9	0	0	0	0	180	0	0	0
59.0 to 59.9	0	0	0	0	173	0	0	0
60.0 to 60.9	0	0	0	0	274	0	0	0
61.0 to 61.9	0	0	0	0	1	0	0	0
62.0 to 62.9	0	0	0	0	4	0	0	0
63.0 to 63.9	0	0	0	0	3	0	0	0
64.0 to 64.9	0	0	0	0	0	0	0	0
65.0 to 65.9	0	0	0	0	0	0	0	0

6.5.8 When comparing the operation of the Airport in 2023 under the Proposed Scheme at night-time with operation under the existing noise limits, the results show that there are no increases of more than 3 dB between the LOAEL (45 dB) and SOAEL (55 dB). There are no increases of 1 - 1.9 dB for residents. On this basis, **the effect of the Proposed Scheme during night-time of 2023 would not be significant**.

Table 6.5 Number of dwellings by change of daytime noise level (dB), per noise contour ($L_{Aeq, T}$ dB), as a result of comparing the 2024 Proposed Scheme with the existing Condition 10 noise limits for 2024

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 -0.1	0.0 to 0.9	1.0 to 1.9	2 to 2.9.0	>=3
51.0 to 51.9	0	0	0	0	3,894	0	0	0
52.0 to 52.9	0	0	0	0	2,450	0	0	0
53.0 to 53.9	0	0	0	0	1,551	0	0	0
54.0 to 54.9	0	0	0	0	912	0	0	0
55.0 to 55.9	0	0	0	0	1,355	0	0	0
56.0 to 56.9	0	0	0	0	598	0	0	0
57.0 to 57.9	0	0	0	0	747	0	0	0
58.0 to 58.9	0	0	0	0	670	0	0	0
59.0 to 59.9	0	0	0	0	971	0	0	0
60.0 to 60.9	0	0	0	0	614	0	0	0
61.0 to 61.9	0	0	0	0	575	0	0	0
62.0 to 62.9	0	0	0	0	402	0	0	0
63.0 to 63.9	0	0	0	0	205	0	0	0
64.0 to 64.9	0	0	0	0	144	0	0	0
65.0 to 65.9	0	0	0	0	330	0	0	0
66.0 to 66.9	0	0	0	0	2	0	0	0
67.0 to 67.9	0	0	0	0	0	0	0	0
68.0 to 68.9	0	0	0	0	7	0	0	0

6.5.9 When comparing the 2024 daytime noise levels under the Proposed Scheme as compared without the Proposed Scheme operating under the existing noise limits, 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 2024 would not be significant**.

Table 6.6 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 Proposed Scheme scenario with the existing Condition 10 noise limits for 2024

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 -0.1	0.0 to 0.9	1.0 to 1.9	2 to 2.9.0	>=3
45.0 to 45.9	0	0	0	0	6,139	0	0	0
46.0 to 46.9	0	0	0	0	5,655	0	0	0
47.0 to 47.9	0	0	0	0	3,646	0	0	0
48.0 to 48.9	0	0	0	0	1,595	0	0	0
49.0 to 49.9	0	0	0	0	1,301	0	0	0
50.0 to 50.9	0	0	0	0	960	0	0	0
51.0 to 51.9	0	0	0	0	762	0	0	0
52.0 to 52.9	0	0	0	0	732	0	0	0
53.0 to 53.9	0	0	0	0	862	0	0	0
54.0 to 54.9	0	0	0	0	873	0	0	0
55.0 to 55.9	0	0	0	0	536	0	0	0
56.0 to 56.9	0	0	0	0	565	0	0	0
57.0 to 57.9	0	0	0	0	257	0	0	0
58.0 to 58.9	0	0	0	0	180	0	0	0
59.0 to 59.9	0	0	0	0	185	0	0	0
60.0 to 60.9	0	0	0	0	262	0	0	0
61.0 to 61.9	0	0	0	0	1	0	0	0
62.0 to 62.9	0	0	0	0	4	0	0	0
63.0 to 63.9	0	0	0	0	3	0	0	0
64.0 to 64.9	0	0	0	0	0	0	0	0
65.0 to 65.9	0	0	0	0	0	0	0	0

6.5.10 When comparing the operation under the Proposed Scheme in 2024 for night-time noise levels with the situation without the Proposed Scheme, the results show that there are no increases of more than 3 dB between the LOAEL (45 dB) and SOAEL (55 dB). There are no increases of 1 dB for residents. On this basis, **the effect of the Proposed Scheme during night-time of 2024 would not be significant**.

Table 6.7 Number of dwellings by change of daytime noise level (dB), per noise contour ($L_{Aeq,T}$ dB), as a result of comparing the 2025 scenario with the existing Condition 10 noise limits for 2025

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 -0.1	0.0 to 0.9	1.0 to 1.9	2 to 2.9.0	>=3
51.0 to 51.9	0	0	0	0	0	0	0	0
52.0 to 52.9	0	0	0	0	0	0	0	0
53.0 to 53.9	0	0	0	0	0	0	0	0
54.0 to 54.9	0	0	0	0	0	0	0	0
55.0 to 55.9	0	0	0	0	0	0	0	0
56.0 to 56.9	0	0	0	0	0	0	0	0
57.0 to 57.9	0	0	0	0	0	0	0	0
58.0 to 58.9	0	0	0	0	0	0	0	0
59.0 to 59.9	0	0	0	0	0	0	0	0
60.0 to 60.9	0	0	0	0	0	0	0	0
61.0 to 61.9	0	0	0	0	0	0	0	0
62.0 to 62.9	0	0	0	0	0	0	0	0
63.0 to 63.9	0	0	0	0	0	0	0	0
64.0 to 64.9	0	0	0	0	0	0	0	0
65.0 to 65.9	0	0	0	0	0	0	0	0
66.0 to 66.9	0	0	0	0	0	0	0	0
67.0 to 67.9	0	0	0	0	0	0	0	0
68.0 to 68.9	0	0	0	0	0	0	0	0

6.5.11 When comparing the 2025 daytime noise levels under the Proposed Scheme as compared with the situation without the Proposed Scheme, 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 2025 would not be significant**.

Table 6.8 Number of dwellings by change of night-time noise level (dB), per noise contour ($L_{Aeq,T}$ dB), as a result of comparing the 2025 scenario with the existing Condition 10 noise limits for 2025

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 -0.1	0.0 to 0.9	1.0 to 1.9	2 to 2.9.0	>=3
45.0 to 45.9	0	0	0	0	5,870	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 -0.1	0.0 to 0.9	1.0 to 1.9	2 to 2.9.0	>=3
46.0 to 46.9	0	0	0	0	5,272	0	0	0
47.0 to 47.9	0	0	0	0	2,716	0	0	0
48.0 to 48.9	0	0	0	0	1,206	0	0	0
49.0 to 49.9	0	0	0	0	1,398	0	0	0
50.0 to 50.9	0	0	0	0	810	0	0	0
51.0 to 51.9	0	0	0	0	840	0	0	0
52.0 to 52.9	0	0	0	0	667	0	0	0
53.0 to 53.9	0	0	0	0	811	0	0	0
54.0 to 54.9	0	0	0	0	760	0	0	0
55.0 to 55.9	0	0	0	0	527	0	0	0
56.0 to 56.9	0	0	0	0	563	0	0	0
57.0 to 57.9	0	0	0	0	117	0	0	0
58.0 to 58.9	0	0	0	0	227	0	0	0
59.0 to 59.9	0	0	0	0	282	0	0	0
60.0 to 60.9	0	0	0	0	116	0	0	0
61.0 to 61.9	0	0	0	0	1	0	0	0
62.0 to 62.9	0	0	0	0	7	0	0	0
63.0 to 63.9	0	0	0	0	0	0	0	0
64.0 to 64.9	0	0	0	0	0	0	0	0
65.0 to 65.9	0	0	0	0	0	0	0	0

6.5.12 When comparing the 2025 night-time noise levels under the Proposed Scheme as compared with the situation without the Proposed Scheme and the existing limits, 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 2025 would not be significant**.

Table 6.9 Number of dwellings by change of day time noise level (dB), per noise contour ($L_{Aeq,\ T}$ dB), as a result of comparing the 2028 scenario with the old 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 -0.1	0.0 to 0.9	1.0 to 1.9	2 to 2.9.0	>=3
51.0 to 51.9	0	0	0	0	2,120	0	0	0
52.0 to 52.9	0	0	0	0	1,116	0	0	0
53.0 to 53.9	0	0	0	0	1,358	0	0	0
54.0 to 54.9	0	0	0	0	783	0	0	0
55.0 to 55.9	0	0	0	0	733	0	0	0
56.0 to 56.9	0	0	0	0	756	0	0	0
57.0 to 57.9	0	0	0	0	784	0	0	0
58.0 to 58.9	0	0	0	0	761	0	0	0
59.0 to 59.9	0	0	0	0	577	0	0	0
60.0 to 60.9	0	0	0	0	492	0	0	0
61.0 to 61.9	0	0	0	0	113	0	0	0
62.0 to 62.9	0	0	0	0	234	0	0	0
63.0 to 63.9	0	0	0	0	278	0	0	0
64.0 to 64.9	0	0	0	0	113	0	0	0
65.0 to 65.9	0	0	0	0	1	0	0	0
66.0 to 66.9	0	0	0	0	7	0	0	0
67.0 to 67.9	0	0	0	0	0	0	0	0
68.0 to 68.9	0	0	0	0	0	0	0	0

6.5.13 When comparing the 2028 daytime noise levels under the Proposed Schemed as compared with the situation without the Proposed Scheme, 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 6.10 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 scenario with the old Condition 10 noise limits for 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 -0.1	0.0 to 0.9	1.0 to 1.9	2 to 2.9.0	>=3
45.0 to 45.9	0	0	0	0	5,696	0	0	0
46.0 to 46.9	0	0	0	0	4,197	0	0	0
47.0 to 47.9	0	0	0	0	2,088	0	0	0
48.0 to 48.9	0	0	0	0	1,346	0	0	0
49.0 to 49.9	0	0	0	0	965	0	0	0
50.0 to 50.9	0	0	0	0	731	0	0	0
51.0 to 51.9	0	0	0	0	869	0	0	0
52.0 to 52.9	0	0	0	0	708	0	0	0
53.0 to 53.9	0	0	0	0	861	0	0	0
54.0 to 54.9	0	0	0	0	549	0	0	0
55.0 to 55.9	0	0	0	0	536	0	0	0
56.0 to 56.9	0	0	0	0	257	0	0	0
57.0 to 57.9	0	0	0	0	195	0	0	0
58.0 to 58.9	0	0	0	0	207	0	0	0
59.0 to 59.9	0	0	0	0	222	0	0	0
60.0 to 60.9	0	0	0	0	3	0	0	0
61.0 to 61.9	0	0	0	0	5	0	0	0
62.0 to 62.9	0	0	0	0	3	0	0	0
63.0 to 63.9	0	0	0	0	0	0	0	0
64.0 to 64.9	0	0	0	0	0	0	0	0
65.0 to 65.9	0	0	0	0	0	0	0	0

6.5.14 When comparing the 2028 night-time noise levels under the Proposed Scheme with the situation without the Proposed Scheme, 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**.

Table 6.11 Number of dwellings by change of daytime noise level (dB), per noise contour ($L_{Aeq,\ T}$ dB), as a result of comparing the 2031 scenario with the old 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 -0.1	0.0 to 0.9	1.0 to 1.9	2 to 2.9.0	>=3
51.0 to 51.9	0	0	0	1,547	366	0	0	0
52.0 to 52.9	0	0	0	955	50	0	0	0
53.0 to 53.9	0	0	0	1,296	19	0	0	0
54.0 to 54.9	0	0	0	661	0	0	0	0
55.0 to 55.9	0	0	0	787	0	0	0	0
56.0 to 56.9	0	0	0	655	0	0	0	0
57.0 to 57.9	0	0	0	1,086	0	0	0	0
58.0 to 58.9	0	0	0	441	0	0	0	0
59.0 to 59.9	0	0	0	648	0	0	0	0
60.0 to 60.9	0	0	0	327	0	0	0	0
61.0 to 61.9	0	0	0	231	0	0	0	0
62.0 to 62.9	0	0	0	130	0	0	0	0
63.0 to 63.9	0	0	0	351	0	0	0	0
64.0 to 64.9	0	0	0	0	0	0	0	0
65.0 to 65.9	0	0	0	2	1	0	0	0
66.0 to 66.9	0	0	0	5	0	0	0	0
67.0 to 67.9	0	0	0	0	0	0	0	0
68.0 to 68.9	0	0	0	0	0	0	0	0

6.5.15 When comparing the 2031 daytime noise levels under the Proposed Scheme as compared with the situation without the Proposed Scheme from 2028, the results show that there are no increases or decreases of more than 3 dB between the LOAEL (51 dB) and SOAEL (63 dB). Further, there are no increases or decreases of 1 dB or more for any residents experiencing noise above SOAEL. On this basis, **the effect of the Proposed Scheme during daytime of 2031 would not be significant**.

Table 6.12 Number of dwellings by change of night-time noise level (dB), per noise contour ($L_{Aeq,T}$ dB), as a result of comparing the 2031 scenario with the old 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 -0.1	0.0 to 0.9	1.0 to 1.9	2 to 2.9.0	>=3
45.0 to 45.9	0	0	0	1,133	3,991	0	0	0
46.0 to 46.9	0	0	0	805	2,352	0	0	0
47.0 to 47.9	0	0	0	618	908	0	0	0
48.0 to 48.9	0	0	0	885	576	0	0	0
49.0 to 49.9	0	0	0	316	296	0	0	0
50.0 to 50.9	0	0	0	440	502	0	0	0
51.0 to 51.9	0	0	0	732	192	0	0	0
52.0 to 52.9	0	0	0	478	238	0	0	0
53.0 to 53.9	0	0	0	184	229	0	0	0
54.0 to 54.9	0	0	0	402	346	0	0	0
55.0 to 55.9	0	0	0	174	70	0	0	0
56.0 to 56.9	0	0	0	78	188	0	0	0
57.0 to 57.9	0	0	0	7	59	0	0	0
58.0 to 58.9	0	0	0	146	123	0	0	0
59.0 to 59.9	0	0	0	0	115	0	0	0
60.0 to 60.9	0	0	0	2	1	0	0	0
61.0 to 61.9	0	0	0	3	2	0	0	0
62.0 to 62.9	0	0	0	0	0	0	0	0
63.0 to 63.9	0	0	0	0	0	0	0	0
64.0 to 64.9	0	0	0	0	0	0	0	0
65.0 to 65.9	0	0	0	0	0	0	0	0

6.5.16 When comparing the 2031 night-time noise levels under the Proposed Scheme with the situation with the operation of the Airport without the Proposed Scheme from 2028, the results show that there are no increases or decreases of more than 3 dB between the LOAEL (45 dB) and SOAEL (55 dB). Further, there are no increases or decreases of 1 dB or more for any residents experiencing noise above SOAEL. On this basis, **the effect of the Proposed Scheme during daytime of 2031 would not be significant**.

Table 6.13 Number of dwellings by change of daytime noise level (dB), per noise contour ($L_{Aeq,\ T}$ dB), as a result of comparing the 2028 scenario under the Proposed Scheme with the 12.4 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 -0.1	0.0 to 0.9	1.0 to 1.9	2 to 2.9.0	>=3
51.0 to 51.9	0	0	0	513	1,607	0	0	0
52.0 to 52.9	0	0	0	330	786	0	0	0
53.0 to 53.9	0	0	0	367	991	0	0	0
54.0 to 54.9	0	0	0	284	499	0	0	0
55.0 to 55.9	0	0	0	103	630	0	0	0
56.0 to 56.9	0	0	0	128	628	0	0	0
57.0 to 57.9	0	0	0	243	541	0	0	0
58.0 to 58.9	0	0	0	161	600	0	0	0
59.0 to 59.9	0	0	0	0	577	0	0	0
60.0 to 60.9	0	0	0	0	492	0	0	0
61.0 to 61.9	0	0	0	6	107	0	0	0
62.0 to 62.9	0	0	0	0	234	0	0	0
63.0 to 63.9	0	0	0	0	278	0	0	0
64.0 to 64.9	0	0	0	1	112	0	0	0
65.0 to 65.9	0	0	0	0	1	0	0	0
66.0 to 66.9	0	0	0	0	7	0	0	0
67.0 to 67.9	0	0	0	0	0	0	0	0
68.0 to 68.9	0	0	0	0	0	0	0	0

6.5.17 When comparing the 2028 daytime noise levels under the Proposed Scheme with the operation of the Airport at 12.4 mppa in the future baseline for 2028 in compliance with Condition 10, the results show that there are no increases or decreases of more than 3 dB between the LOAEL (51 dB) and SOAEL (63 dB). Further, there are no increases or decreases 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 6.14 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 scenario under the Proposed Scheme with the 12.4mppa 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 -0.1	0.0 to 0.9	1.0 to 1.9	2 to 2.9.0	>=3
45.0 to 45.9	0	0	0	2,367	1,169	2,160	0	0
46.0 to 46.9	0	0	0	1,356	1,207	1,634	0	0
47.0 to 47.9	0	0	0	1,122	873	93	0	0
48.0 to 48.9	0	0	0	1,059	287	0	0	0
49.0 to 49.9	0	0	0	746	219	0	0	0
50.0 to 50.9	0	0	0	616	115	0	0	0
51.0 to 51.9	0	0	81	735	53	0	0	0
52.0 to 52.9	0	0	227	450	31	0	0	0
53.0 to 53.9	0	0	87	696	78	0	0	0
54.0 to 54.9	0	0	0	478	71	0	0	0
55.0 to 55.9	0	0	0	507	29	0	0	0
56.0 to 56.9	0	0	0	140	117	0	0	0
57.0 to 57.9	0	0	0	192	3	0	0	0
58.0 to 58.9	0	0	0	157	50	0	0	0
59.0 to 59.9	0	0	0	180	42	0	0	0
60.0 to 60.9	0	0	0	0	3	0	0	0
61.0 to 61.9	0	0	0	2	3	0	0	0
62.0 to 62.9	0	0	0	3	0	0	0	0
63.0 to 63.9	0	0	0	0	0	0	0	0
64.0 to 64.9	0	0	0	0	0	0	0	0
65.0 to 65.9	0	0	0	0	0	0	0	0

6.5.18 When comparing the 2028 night-time noise levels under the Proposed Scheme as compared with the operation of the Airport at 12.4 mppa in the future baseline for 2028 in compliance with Condition 10, the results show that there are no increases or decreases of more than 3 dB between the LOAEL (45 dB) and SOAEL (55 dB). Further, there are no increases or decreases 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**.

6.5.19 The findings of the above tables, show that there are **no significant adverse effect on residences** from the Proposed Scheme.

6.6 Non-residential receptors L_{Aeq} assessment

6.6.1 **Table 6.15** shows the predicted noise levels for the various Proposed Scheme and baseline scenarios and **Table 6.16** shows the differences within the identified comparisons of interest. The results show that there would be no changes of 1 dB or more above the threshold criteria. **On this basis, the effect of the Proposed Scheme would not be significant at these locations**.

6.6.2 Since publication of the 2021 ES Addendum, Prospect House Day Nursery has been identified as an additional non-residential receptor. Prospect House Day Nursery would be within the 50 dB $_{LAeq,\ 16\ hour}$ for every baseline and Proposed Scheme scenario and as such would be above the screening criteria for significant effect. As shown in **Table 6.16**, the change in noise levels for all other non-residential locations in Luton has been predicted to be less than 1 dB (Wandon End has a maximum change in noise level of 0.7 dB). There is no reason to think the noise at Prospect House Day Nursery would be sufficiently different for there to be a change of 1dB or greater. Therefore, the effect at Prospect House Day Nursery can be concluded to be **not significant**.

Table 6.15 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																			
	2023 current Condition 10 noise contour		2024 current Condition 10 noise contour		2025 current Condition 10 noise contour		2023 Proposed Scheme 18 mppa noise contour		2024 Proposed Scheme 18 mppa noise contour		2025 19 mppa noise contour		Existing future Condition 10 noise contour (2028 onwards)		12.4 mppa future baseline 2028 noise contour		2028 19 mppa noise contour		2031 19 mppa noise contour	
	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
Old Knebworth Lodge Farm	44	38	44	38	44	38	44	39	44	39	44	39	42	37	43	38	42	38	42	37
Caddington	54	50	54	50	54	50	55	51	54	50	54	50	54	49	54	49	54	50	54	50
Park Town, Luton	61	55	61	55	61	55	61	56	61	56	61	55	59	54	59	55	59	55	59	54
Whitwell	47	42	47	42	47	42	48	43	47	43	47	42	46	41	46	42	46	42	46	41
Breachwood Green	54	49	54	49	54	49	55	50	54	50	54	50	53	49	53	49	53	49	53	49
St Pauls Walden	53	48	53	48	53	49	54	49	54	49	53	49	52	48	53	48	53	48	52	48
Farley Hill School Luton	49	44	49	44	49	44	50	44	49	44	49	44	48	43	48	43	48	43	48	43
Slip End	60	54	60	54	60	54	61	55	60	55	60	55	59	53	59	55	59	54	58	53
Harpenden Children's Home	39	34	39	34	39	34	40	34	40	34	39	34	38	33	38	33	38	33	38	32
Walkern	46	42	46	42	46	42	46	43	46	42	46	42	46	41	46	41	46	42	46	42

Location	Noise levels ($L_{Aeq,T}$ dB) predicted at non-residential receptors																			
	2023 current Condition 10 noise contour		2024 current Condition 10 noise contour		2025 current Condition 10 noise contour		2023 Proposed Scheme 18 mppa noise contour		2024 Proposed Scheme 18 mppa noise contour		2025 19 mppa noise contour		Existing future Condition 10 noise contour (2028 onwards)		12.4 mppa future baseline 2028 noise contour		2028 19 mppa noise contour		2031 19 mppa noise contour	
	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
Stevenage (Eastern Perimeter)	49	44	49	44	49	44	49	45	49	45	49	45	48	44	48	43	48	44	48	44
Stevenage Station	52	48	52	48	52	48	53	49	52	49	52	48	52	47	52	47	52	48	52	48
Luton (Wandon End)	54	48	54	48	54	48	54	49	54	49	54	48	52	47	52	48	52	48	52	47
Kensworth	49	45	50	45	50	45	50	46	50	46	50	46	49	45	49	45	49	46	49	45
Hudnall Corner	47	41	47	41	47	41	48	42	47	42	47	42	46	40	46	41	46	41	45	40
Flamstead	50	45	50	45	50	45	51	45	51	45	50	45	49	43	49	45	49	44	49	43
Markyate	53	47	53	47	53	47	53	48	53	48	53	47	51	46	52	47	51	46	51	45

Table 6.16 Differences in noise level ($L_{Aeq,T}$ dB) predicted between Proposed Scheme and baseline scenarios for non-residential receptors

Location	2023 proposed scheme 18 mppa minus 2023 current limit		2024 proposed scheme 18 mppa minus 2024 current limit		2025 19 mppa minus 2025 current limit		2028 19 mppa minus existing future Condition 10		2028 19 mppa minus 2028 12.4 mppa		2031 19 mppa minus existing future Condition 10		Significant
	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	
Old Knebworth Lodge Farm	0.4	0.8	0.3	0.7	0.0	0.4	0.1	0.7	-0.2	-0.4	-0.3	-0.3	No

Location	2023 proposed scheme 18 mppa minus 2023 current limit		2024 proposed scheme 18 mppa minus 2024 current limit		2025 19 mppa minus 2025 current limit		2028 19 mppa minus existing future Condition 10		2028 19 mppa minus 2028 12.4 mppa		2031 19 mppa minus existing future Condition 10		Significant
	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	
Caddington	0.5	0.8	0.3	0.7	0.0	0.4	0.1	0.7	-0.1	0.6	-0.1	0.4	No
Park Town, Luton	0.5	0.7	0.3	0.7	0.0	0.4	0.1	0.7	0.6	-0.1	-0.1	-0.1	No
Whitwell	0.5	0.8	0.3	0.8	0.0	0.4	0.1	0.7	-0.2	0.2	-0.2	0.0	No
Breachwood Green	0.5	0.7	0.2	0.7	0.0	0.4	0.1	0.6	-0.1	0.4	-0.2	0.2	No
St Pauls Walden	0.5	0.8	0.2	0.7	0.0	0.4	0.1	0.7	-0.1	0.5	-0.2	0.2	No
Farley Hill School Luton	0.5	0.7	0.2	0.7	0.0	0.4	0.1	0.6	0.2	0.0	-0.2	-0.1	No
Slip End	0.5	0.7	0.3	0.7	0.0	0.4	0.1	0.7	-0.2	-1.1	-0.3	-0.4	No
Harpenden Children's Home	0.5	0.7	0.3	0.7	0.0	0.4	0.1	0.6	0.1	-0.2	-0.3	-0.4	No
Walkern	0.5	0.8	0.2	0.7	0.0	0.4	0.1	0.6	0.1	1.2	0.0	0.4	No
Stevenage (Eastern Perimeter)	0.4	0.8	0.2	0.8	0.0	0.4	0.1	0.6	0.1	1.1	0.0	0.4	No
Stevenage Station	0.5	0.7	0.3	0.8	0.0	0.4	0.1	0.7	0.0	0.8	0.0	0.5	No
Luton (Wandon End)	0.5	0.7	0.3	0.7	0.0	0.4	0.1	0.7	0.0	-0.1	-0.2	-0.1	No

Location	2023 proposed scheme 18 mppa minus 2023 current limit		2024 proposed scheme 18 mppa minus 2024 current limit		2025 19 mppa minus 2025 current limit		2028 19 mppa minus existing future Condition 10		2028 19 mppa minus 2028 12.4 mppa		2031 19 mppa minus existing future Condition 10		Significant
	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	
Kensworth	0.4	0.7	0.2	0.7	0.0	0.4	0.1	0.7	0.0	0.9	0.0	0.4	No
Hudnall Corner	0.4	0.7	0.3	0.7	0.0	0.4	0.1	0.7	-0.1	-0.5	-0.3	-0.3	No
Flamstead	0.5	0.7	0.3	0.7	0.0	0.4	0.1	0.7	-0.3	-0.4	-0.3	-0.3	No
Markyate	0.4	0.7	0.2	0.7	0.0	0.4	0.1	0.6	-0.3	-0.5	-0.3	-0.3	No

6.7 L_{Amax} assessment

Residential Receptors

6.7.1 The data in **Appendix 8E** 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 in **Appendix 8E** 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 6.17**, with a comparison between the Proposed Scheme and continuation of the existing operation in **Table 6.18**.

Table 6.17 Night-time ATMs for most common aircraft types

Aircraft	2023 18 mppa	2024 18 mppa	2025 19 mppa	2028 19 mppa	2031 19mppa
A320ceo	1296	1290	1292	438	0
A321ceo	499	451	303	0	0
B737-800	551	529	132	49	0
Total 'old' aircraft	2347	2270	1727	487	0
A320neo	742	819	829	2040	2354
A321neo	793	842	926	1210	1150
B737-Max	254	277	675	758	805
Total 'new' aircraft	1790	1938	2430	4008	4309
Total of the above aircraft	4136	4208	4157	4495	4309

Table 6.18 Comparison of ATMs during the night-time

Aircraft sets	Deduction of ATMs for assessment years	
	2025 19 mppa flows minus 2025 current limit flows	2028 19 mppa flows minus 18 mppa 2028+flows
Old aircraft: A320ceo, A321ceo, B737-800	152	-470
New aircraft: A320neo, A321neo, B737-Max	214	571
Total of the above	366	101

6.7.2 The results show that the proportion of the loudest aircraft is predicted to decrease in comparison with the new quieter aircraft. By 2028, the proportion of newer aircraft is greater with the Proposed Scheme than with the 18mppa baseline flows It should also be noted that total increase in ATMs (i.e. also including other aircraft not included in the above table, see forecasts in **Appendix 8B** in

Volume 3: Figures and Appendices) is small, equating to an average in the 92-day summer period of four additional flights during the night-time in 2025 (in comparison with the current limit) and two in 2028 (in comparison with the 18 mppa 2028 scenario). Therefore, the absolute L_{Amax} level will reduce for a significant number of ATMs.

Non-residential noise sensitive receptors

6.7.3 **Appendix 8F** in **Volume 3: Figures and Appendices** presents the predicted L_{Amax} levels at non-residential receptors for the most common and loudest aircraft (for either the Proposed Scheme or without Proposed Scheme scenarios). 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 8B** in **Volume 3: Figures and Appendices**), but by 2028, the A321ceo is not being used 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.**

6.8 Assessment Summary

6.8.1 A summary of the results of the assessment of the noise is provided in **Table 6.19**.

Table 6.19 Summary of significance of adverse effects

Receptor and summary of predicted effects	Significance	Summary rationale
Residences	**Not Significant**	With the Proposed Scheme, residents in 1,993 dwellings would experience a night-time noise level above SOAEL (55 dB $L_{Aeq, 8\ hour}$). However, no increases of more than 1dB than existing Condition 10 limits allow.
Non-residential receptors at Park Town in Luton and Slip End	**Not Significant**	No Increases in noise level of at least 1 dB and above the screening criteria for significance are predicted.

6.8.2 In the 2021 ESA there were significant effects on residential and non-residential receptors as a result of the Proposed Scheme with noise level changes of 1 dB and above. Differences in the shape of baseline noise contours, as a result of maintaining consistent modelling methodology and fleet mix between the Proposed Scheme and baseline scenarios, has meant that exceedances of 1 dB are no longer identified.

6.9 Consideration of optional additional mitigation

6.9.1 The assessment of noise effects identified the 18 mppa 2023 scenario as the worst-case year in terms of additional dwellings affected by noise above SOAEL. The resulting area and number of dwellings related to the LOAEL and SOAEL are presented in **Table 6.20**.

Table 6.20 LOAEL and SOAEL for various noise model scenarios

Scenario	Area of SOAEL (sq.km)	No. Dwellings in SOAEL	Area of LOAEL (sq.km)	No. Dwellings in LOAEL
Daytime				
Current Condition 10 for 2023	6.6	639	53.6	14,227
Proposed Scheme2023	7.1	744	57.6	16,282
Night-time				
Current Condition 10 for 2023	10.1	1,671	60.6	19,589
Proposed Scheme 2023	11.5	1,993	68.5	24,602

Mitigation for properties exposed to noise higher than SOAEL

6.9.2 For the daytime situation, a total of 744 dwellings are forecast to be exposed to noise levels above 63 dB $L_{Aeq16hr}$ (SOAEL) under the 2023 Proposed Scheme scenario . Based on the current permission operating in 2023, 639 of these properties would already be exposed to these noise levels. Therefore, 105 new properties would be exposed to an increased level of noise due to the forecasted increase in air traffic in the 2023 Proposed Scheme scenario.

6.9.3 For the night-time, a total of 1,993 dwellings were predicted to be exposed to noise levels above 55 dB $L_{Aeq\ 8hr}$ (SOAEL) with the 2023 Proposed Scheme scenario and therefore eligible for insulation. There are currently 1,671 properties within the SOAEL based on the current permission for 2023. Therefore, in the 2023 Proposed Scheme scenario an increase of 322 new properties would be exposed to a level of noise due to the forecasted increase in air traffic.

6.9.4 The 105 additional properties above the daytime SOAEL would already be included within the night-time SOAEL contours and therefore the mitigation requirements would be based on the night-time results.

6.9.5 Additional measures will be needed to mitigate the 322 additional dwellings that would be predicted to experience noise levels above SOAEL as a result of the Proposed Scheme.

6.9.6 As 2023 is forecast to be the worst-case year in terms of noise insulation provision, the 2023 noise insulation eligibility contour would be fixed for 5 years. Therefore, the scheme would not change each year, but would always be based on 2023 data, allowing everyone affected by the worst-case year to be eligible for insulation in future years.

6.9.7 In accordance with the Noise Action Plan for the Airport, noise insulation will be provided to residential receptors exposed to noise above SOAEL as required by the first aim of the Noise Policy Statement for England. LLAOL would continue spending up to approximately £3,000 per property to enhance noise insulation.

6.9.8 Eligible properties are assessed in accordance with the Noise Insulation Scheme Policy v4. 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.

6.10 Conclusions of significance evaluation

6.10.1 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.

6.10.2 No significant noise effects from the Proposed Scheme have been identified.

7. Health

7.1 Introduction

7.1.1 **Chapter 9: Health** of the 2021 ES Addendum (2021 ESA) focused on the health effects of the change in noise exposure arising from the Proposed Scheme. The 2021 ESA concluded that while at the individual-level the change in noise exposure was estimated to be small, and it would not result in individual-level measurable health effects, at the population level, the health effects would be measurable because of the larger size of the exposed population subject to small changes in noise exposure. The predicted health effects related to the change in noise exposure linked to the proposed Condition 10 variation were, therefore, judged overall, to continue to have an adverse health effect at the population level that was of **moderate significance** in the assessment years 2021, 2022, and 2028.

7.1.2 Since publication of the 2021 ESA, the impacts of COVID-19, mean that 2021, and 2022 are no longer relevant assessment years, and the year in which 19 mppa is forecast to be reached has slipped from 2024 to 2025. There is no requirement to update the baseline, and legislation and policy sections, as there have been no material changes since the drafting of the 2021 ESA.

7.1.3 This chapter of the ES Addendum therefore provides an update to the likely significant effects of the Proposed Scheme with respect to human health effects resulting from the changes to the in-air aircraft noise assessment presented in **Chapter 6: Noise** above. This chapter on health should be read in conjunction with **Chapter 2: Description of the Proposed Scheme** and with **Chapter 6: 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, and the 2021 ESA.

7.2 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

7.2.1 The results of the noise assessment (see **Chapter 6: Noise**) and the fleet forecast (see **Appendix 8B** 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).

7.2.2 The projections set out in **Chapter 2: Description of the Proposed Scheme**, show that recovery to 18 mppa is expected to occur by 2024 and reach 19 mppa by 2025.

7.2.3 The assessment in **Chapter 6: Noise**, shows that the worst-case year for noise exposure for residents is 2023 even though 19 mppa will only be reached in 2024. This is because of the forecasted changes in airline fleet mix from 2024 onwards which is expected to reduce noise levels even as the number of flights increases.

7.2.4 The assessment below focuses on the following four comparisons of the scenarios described in the temporal scope (see **Section 6.3** in **Chapter 6: Noise**):

- comparison of the noise levels under the Proposed Scheme in 2023 (operating at 18 mppa) against the situation without the Proposed Scheme operating in compliance with the existing

Condition 10 limits for 2023 - 2027, using the assessment year 2023 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 2024 scenario under the Proposed Scheme, against the worst-case year in terms of population affected (assessment year 2023), with the existing Condition 10 limits for 2023 - 2027, using the assessment year 2024 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 under the Proposed Scheme, 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 under the Proposed Scheme, with the existing Condition 10 limits for 2028 onwards showing the long-term effects.

Change in noise exposure across the affected residential population

7.2.5 As set out in **Chapter 6: Noise**, the proposed variation to Condition 10 is expected to increase noise levels overall in the following ways:

- When comparing the 2023 18 mppa ***daytime noise levels*** under the Proposed Scheme with operation of the Airport in compliance with the existing Condition 10 for 2023, the noise assessment shows that almost all of the affected dwellings are expected to experience a small change in noise levels, an increase of between 0.0 to 0.9 dB $_{LAeq\ 16hr}$. 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 2023 18 mppa ***night-time noise levels*** under the Proposed Scheme with operation of the Airport in compliance with the existing Condition 10 for 2023, the noise assessment shows that the majority of affected dwellings are expected to experience a small change in noise levels, an increase of between 0.0 to 0.9 dB $_{LAeq\ 8hr}$. 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. No dwellings, with noise levels above the SOAEL, are expected to experience a 1. dB or more increase in noise.
- When comparing the 2024 18 mppa ***daytime noise levels*** under the Proposed Scheme with operation of the Airport in compliance with the existing Condition 10, **the worst-case scenario**, for 2024, the noise assessment shows that all the affected dwellings are expected to experience a small change in noise levels, an increase of between 0.0 to 0.9 dB $_{LAeq\ 16hr}$. 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 2024 18 mppa ***night-time noise levels*** under the Proposed Scheme with operation of the Airport in compliance with the existing Condition 10, **the worst-case scenario**, for 2024, the noise assessment shows that approximately half of affected dwellings are expected to experience a small change in noise levels, an increase of between 0.0 to 0.9 dB $_{LAeq\ 8hr}$. 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. No dwellings, with noise levels above the SOAEL, are expected to experience a 1.0 dB or more increase in noise.
- When comparing the 2025 19 mppa ***daytime noise levels*** under the Proposed Scheme with the existing Condition 10, the **first year of 19 mppa**, for 2025, the noise assessment shows that all affected dwellings are expected to experience a **no change** in noise levels. 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 2025 19 mppa ***night-time noise levels*** under the Proposed Scheme with the existing Condition 10, the **first year of 19 mppa**, for 2025, the noise assessment shows that all affected dwellings are expected to experience a small change in noise levels, an increase of between 0.0 to 0.9 dB $_{LAeq\ 8hr}$ 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.
- When comparing the 2028 19 mppa ***daytime noise levels*** under the Proposed Scheme with the future scenario for the original 12.4 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, an increase or decrease of between -0.9 to 0.9 dB $_{LAeq\ 16hr}$ 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*** under the Proposed Scheme with the future scenario for the 12.4 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, an increase or decrease of between -0.9 to 0.9 dB $_{LAeq\ 8hr}$. 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*** under the Proposed Scheme with the existing Condition 10 for 2028, the noise assessment shows that all affected dwellings are expected to experience a small change in noise levels, an increase of between 0.0 to 0.9 dB $_{LAeq\ 16hr}$. 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*** under the Proposed Scheme with the existing Condition 10 for 2028, the noise assessment shows that all affected dwellings are expected to experience a small change in noise levels, an increase of between 0.0 to 0.9 dB $_{LAeq\ 8hr}$ 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 no changes of 1 dB or more above the noise assessment threshold effect criteria for the non-residential receptors.

7.2.6 A summary of the results of the assessment of the health effects from changes in noise exposure is provided in **Table 7.1**.

7.2.7 Percentages have been rounded up (0.5 - 0.9) or down (0.1 - 0.4) to the nearest whole number.

Affected population

Change in the number of people affected in the 2023 18 mppa scenario under the Proposed Scheme, with operation of the Airport in compliance with the existing Condition 10 limits for 2023 - 2027, using the year 2023 only (short term effects)

7.2.8 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.

7.2.9 For the ***daytime***, the comparison of the 2023 18 mppa scenario, with the existing Condition 10 limits for 2023 - 2027, shows that for 2023, for residents currently experiencing noise levels between 51 - 62.9 dB $_{LAeq\ 16hr}$, there is expected to be an increase in noise of between 0.0 to -0.9 dB for 35,565 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 $_{LAeq\ 16hr}$ or more, there is expected to be an increase or decrease in noise of between 0.9 to -0.9 dB for 2,000 residents for a temporary period to the end of 2025, after which time the noise contour decreases to below current Condition 10 limits by 2031. No residents, experiencing noise levels above the SOAEL, are expected to experience a 1 dB or more increase in noise.

7.2.10 For the ***night-time***, the comparison of the 2023 18 mppa scenario, with the existing Condition 10 limits for 2023 - 2027, shows that for 2023, for residents currently experiencing noise levels between 45 - 54.9 dB $_{LAeq\ 16hr}$, there is expected to be an increase in noise of between 0.0 to -0.9 dB for 52,059 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 55dB $_{LAeq\ 8hr}$ or more, there is expected to be an increase or decrease in noise of between 0.9 to -0.9 dB for 5,062 residents for a temporary period to the end of 2025, after which time the noise contour decreases to below current Condition 10 limits by 2031. No 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 2024 18 mppa scenario (the worst-case year in terms of population affected), under the Proposed Scheme, with operation of the Airport in compliance with the existing Condition 10 limits for 2023 - 2027, using the year 2024 only

7.2.11 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.

7.2.12 For the ***daytime***, the comparison of the 2024 18 mppa scenario, with the existing Condition 10 limits for 2023 - 2027, **the worst-case scenario**, shows that for 2024, for residents currently experiencing noise levels between 51 - 62.9 dB $_{LAeq\ 16hr}$, there is expected to be an increase in noise of between 0.0 to -0.9 dB for 33,697 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 $_{LAeq\ 16hr}$ or more, there is expected to be an increase or decrease in noise of between 0.9 to -0.9 dB for 1,863 residents for a temporary period to the end of 2025, after which time the noise contour decreases to below current Condition 10 limits by 2031. No residents, experiencing noise levels above the SOAEL, are expected to experience a 1 dB or more increase in noise.

7.2.13 For the ***night-time***, the comparison of the 2024 18 mppa scenario, with the existing Condition 10 limits for 2023 - 2027, **the worst-case scenario**, shows that for 2024, for residents currently experiencing noise levels between 45 - 54.9 dB $_{LAeq\ 16hr}$, there is expected to be an increase or

decrease in noise of between 0.9 to -0.9 dB for 51,894 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 55dB $_{LAeq\ 8hr}$ or more, there is expected to be an increase or decrease in noise of between 0.9 to -0.9 dB for 5,056 residents for a temporary period to the end of 2025, after which time the noise contour decreases to below current Condition 10 limits by 2031. No 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 under the Proposed Scheme, 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)

7.2.14 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.

7.2.15 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 $_{LAeq\ 16hr}$, there is expected to be a decrease in noise of between -0.9 to -0.1 dB for 4,889 residents, and an increase in noise of between 0.0 to -0.9 dB for 17,249 residents. 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 $_{LAeq\ 16hr}$ or more, there is expected to be an increase in noise of between 0.0 to -0.9 dB for 1,058 residents for a temporary period, after which time the noise contour decreases to below current Condition 10 limits by 2031. No residents, experiencing noise levels above the SOAEL, are expected to experience a 1 dB or more increase in noise.

7.2.16 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 $_{LAeq\ 16hr}$, there is expected to be a decrease in noise of between -0.9 to -0.1 dB for 21,971 residents, and an increase in noise of between 0.0 to -0.9 dB for 8,952 residents. 912 residents are expected to experience a decrease in noise between -0.9 to -01 dB, while 9,202 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 $_{LAeq\ 8hr}$ or more, there is expected to be a decrease in noise of between -0.9 to -0.1 dB for 3,149 residents, while there is expected to be an increase in noise of between 0.0 to -0.9 dB for 543 residents for a temporary period, after which time the noise contour decreases to below current Condition 10 limits by 2031. 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 under the Proposed Scheme, with operation of the Airport in compliance with the existing Condition 10 limits for 2028 onwards showing the long-term effects

7.2.17 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.

7.2.18 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 $_{LAeq\ 16hr}$, there is expected to be an increase or decrease in noise of between 0.9 to -0.9 dB for 22,318

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 $_{LAeq\ 16hr}$ or more, there is expected to be an increase in noise of between 0.0 to -0.9 dB for 1,059 residents for a temporary period to the end of 2025, after which time the noise contour decreases to below current Condition 10 limits by 2031. No residents, experiencing noise levels above the SOAEL, are expected to experience a 1 dB or more increase in noise.

7.2.19 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 $_{LAeq\ 16hr}$, there is expected to be an increase in noise of between 0.0 to -0.9 dB for 41,037 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 55dB $_{LAeq\ 8hr}$ or more, there is expected to be an increase in noise of between 0.9 to -0.9 dB for 3,692 residents for a temporary period, after which time the noise contour decreases to below current Condition 10 limits by 2031. No residents, experiencing noise levels above the SOAEL, are expected to experience a 1 dB or more increase in noise.

Significance of 2023 and 2024 18 mppa compared with existing Condition 10 short term health effects

Significance of the 2023 and 2024 18 mppa short-term health effects across the affected residential population: daytime 51 - 62 dB $_{LAeq\ 16hr}$ and night-time 45 - 54 dB $_{LAeq\ 8hr}$

7.2.20 In both scenarios, for those residents experiencing an increase in noise levels between 51 – 62 dB $_{LAeq,16hr}$ (daytime) and between 45 – 54 dB $_{LAeq,8hr}$ (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), 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 the temporary period of the effect to the end of 2025, after which time the noise contour decreases to below current Condition 10 limits by 2031; 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 $_{LAeq,16hr}$ may experience a lower magnitude of change.

7.2.21 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 $_{LAeq,16hr,}$ and night-time noise levels between 45 – 54 dB $_{LAeq,8hr}$, **the health effect is judged to be minor to moderate significance**.

Significance of the 2023 and 2024 18 mppa short term health effects across the affected residential population: daytime at or above 63 dB $_{LAeq\ 16hr}$ and night-time at or above 55 dB $_{LAeq\ 8hr}$

7.2.22 In both scenarios, for those residents experiencing an increase in daytime noise levels at or above 63 dB $_{LAeq\ 16hr}$ and night-time noise levels at or above 55 dB $_{LAeq\ 8hr}$, the residents' sensitivity is judged to be **medium to high**. While at the individual level the change in exposure is small (<1 dB), across the whole affected population and considering the additional population that is affected, the magnitude of change is judged to be **medium adverse**. While this takes account of

the temporary period of the effect to the end of 2025, after which time the noise contour decreases to below current Condition 10 limits by 2031, it also 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.

7.2.23 Therefore, taking into account the range of sensitivity in residents, for those residents experiencing daytime noise levels at or above 63 dB $_{LAeq,16hr}$ and night-time noise levels at or above 55 dB $_{LAeq\ 8hr}$, **the heath effect is judged to be of moderate significance**.

7.2.24 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.

Significance of the 2023 and 2024 18 mppa short term health effects across the affected worker and visitor population

7.2.25 In both scenarios, for those workers and visitors experiencing an increase in daytime noise levels between 51 – 62 dB $_{LAeq\ 16hr}$ and night-time noise levels between 45 – 54 dB $_{LAeq\ 8hr}$, 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.

7.2.26 Therefore, for those workers and visitors experiencing daytime noise levels between 51 – 62 dB $_{LAeq,16hr}$ and night-time noise levels between 45 – 53 dB $_{LAeq,8hr}$ **the health effect is judged to be not significant**.

7.2.27 For those workers and visitors experiencing an increase in daytime noise levels at or above 63 dB $_{LAeq\ 16hr}$ and night-time noise levels at or above 55 dB $_{LAeq,8hr}$, 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.

7.2.28 Therefore, for those workers and visitors experiencing daytime noise levels at or above 63 dB $_{LAeq,16hr}$ and night-time noise levels at or above 55 dB $_{LAeq\ 8hr}$ the health effect is judged to be **not significant**.

Significance of the 2023 and 2024 18 mppa short term health effects across noise-sensitive facilities

7.2.29 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. The magnitude of change is considered to be **low** overall.

7.2.30 Therefore, the health effect on noise-sensitive non-residential facilities is judged to be **not significant (minor)**.

Significance of the 2023 and 2024 mppa short term health effects across public open spaces and recreational green spaces

7.2.31 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 all these spaces is <1dB, the magnitude of change is judged to be **low 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 **minor adverse**.

7.2.32 Therefore, the health effect on public open spaces and recreational green spaces is judged to be **not significant (minor)**.

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

7.2.33 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 $L_{Aeq\ 8hr}$

7.2.34 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.

7.2.35 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 moderate significance**. 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 $L_{Aeq\ 8hr}$

7.2.36 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), 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.

7.2.37 Therefore, taking into account, the range of sensitivity in residents, for those residents experiencing daytime noise levels at or above 63 dB $_{LAeq,16hr}$ and night-time noise levels at or above 55 dB $_{LAeq\ 8hr}$, **the health effect is judged to be of moderate significance**.

7.2.38 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.

Significance of the 2028 long-term health effects across the affected worker and visitor population

7.2.39 Workers and visitors, in both scenarios, experiencing an increase in daytime noise levels between 51 - 62 dB $_{LAeq,16hr}$ and night-time noise levels 45 - 54 dB $_{LAeq,8hr}$, 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.

7.2.40 Therefore, for those workers and visitors experiencing daytime noise levels between 51 - 62 dB $_{LAeq,16hr}$ and night-time noise levels between 45 - 53 dB $_{LAeq,8hr}$ **the health effect is judged to be not significant**.

7.2.41 Workers and visitors experiencing an increase in daytime noise levels at or above 63 dB $_{LAeq,16hr}$, and night-time noise levels at or above 55 dB $_{LAeq,8hr}$, 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.

7.2.42 Therefore, for those workers and visitors experiencing daytime noise levels at or above 63 dB $_{LAeq,16hr}$, and night-time noise levels at or above 55 dB $_{LAeq,8hr}$ **the health effect is judged to be not significant.**

Significance of the 2028 long term health effects across noise-sensitive facilities

7.2.43 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.

7.2.44 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.

7.2.45 The magnitude of is judged to be **very low** overall.

7.2.46 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

7.2.47 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 <1 dB, the magnitude of change is judged to be **low-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 **minor adverse**.

7.2.48 Therefore, the effect on public open spaces and recreational green spaces is judged to be **not significant (minor)**.

Table 7.1 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 2023 and 2024 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	Minor to Moderate **(Potentially Significant)**	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. While the individual level increase in noise is small, a 1 dB change, across the whole affected population, the change in magnitude is judged to be minor to moderate adverse. While this takes account of the temporary period of the effect to the end of 2025, after which time the noise contour decreases to below current Condition 10 limits by 2031, 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).
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.

Receptor and summary of predicted effects	Sensitivity/ importance/ value of receptor[1]	Magnitude of change[2]	Significance[3]	Summary rationale
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 2023 and 2024 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. While this takes account of the temporary period of the effect to the end of 2025, after which time the noise contour decreases to below current Condition 10 limits by 2031, 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.

Receptor and summary of predicted effects	Sensitivity/ importance/ value of receptor[1]	Magnitude of change[2]	Significance[3]	Summary rationale
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 2023 and 2024 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 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	Low Adverse	Minor (not s**ignificant**)	The estimated increase in noise for all the non-residential noise sensitive facilities is less than 1 dB. 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.
Public open spaces and recreational green spaces	Medium - High	Low Adverse	Minor (**not 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. 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.
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				
Residents affected by an increase in noise between 51 - 62 dB LAeq 16hr (DAYTIME)	Low - High	Low - Medium Adverse	Moderate **(Significant)**	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).

Receptor and summary of predicted effects	Sensitivity/ importance/ value of receptor[1]	Magnitude of change[2]	Significance[3]	Summary rationale
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. 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

Receptor and summary of predicted effects	Sensitivity/ importance/ value of receptor[1]	Magnitude of change[2]	Significance[3]	Summary rationale
				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**)	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. 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.
Public open spaces and recreational green spaces	Medium - High	Low Adverse	Minor – (**not 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. 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

Receptor and summary of predicted effects	Sensitivity/ importance/ value of receptor[1]	Magnitude of change[2]	Significance[3]	Summary rationale
				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**.

7.3 Conclusions of significance evaluation

7.3.1 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 2023, 2024, and 2028.

7.3.2 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. This takes account of the temporary period of the effect to the end of 2025, after which time the noise contour decreases to below current Condition 10 limits by 2031. However, there is 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.

8. Transport

8.1 Introduction

8.1.1 In **Chapter 10: Transport** of the 2021 ES Addendum (2021 ESA) it was concluded that based on the assessment of the potential traffic impacts on the local highway network, and discussions held with Highways England and Luton Borough Council, the level of traffic flow increase resulting from the Proposed Scheme 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.

8.1.2 This chapter of the 2022 ES Addendum addresses potential changes in traffic flows generated by the Proposed Scheme resulting from the change in the year when 19 mppa is forecast to be reached, from 2024 to 2025.

8.2 Baseline

2019 baseline

8.2.1 The 2019 airport related traffic flows (staff and passengers), as presented in the 2021 ES Addendum, are shown in **Table 8.1**. They were estimated by ARUP based on near actual 18 mppa aircraft schedules supplied by York Aviation.

Table 8.1 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**

8.2.2 The existing car parking facilities have been deemed appropriate by LBC for the 18 mppa scenario.

Adjusted Baseline Scenario

8.2.3 The adjusted Condition 10 compliant baseline scenario created for the purpose of the noise and economic assessment is not material in terms of the traffic impact assessment. The transport network successfully handled traffic volumes resulting from 18 mppa in 2019. As such, it was not deemed to be practical or necessary to carry out any additional assessment of the traffic volumes generated by aircraft movements relating to 16.7 mppa.

Predicted effects and their significance

8.2.4 The COVID-19 pandemic has brought many uncertainties with regards to passenger forecasts. Initially, the airport expected passenger volumes to return to 2019 levels (18 mppa) by 2023 in a medium recovery scenario and increase to 19 mppa by 2024 as presented in the 2021 ESA. The most recent forecast assumes that 19 mppa will be reached in 2025. The forecast traffic volumes resulting from the increase in passenger numbers were estimated based on actual (2019) and forecast (2024) aircraft schedules. No change in the forecast aircraft schedules is expected between 2024 and 2025, and as such the forecast 2025 airport related flows are expected to remain the same as in 2024 and are summarised in **Table 8.2** and **Table 8.3**.

Table 8.2 Comparison of 2019 18 mppa and 2025 19 mppa forecast airport related flows for AM Peak

Inbound/ Outbound Flow	2019 AM flows (18 mppa)	2025 AM flows (19 mppa)	Difference 18 mppa/ 19mppa
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**

Table 8.3 Comparison of 2019 18 mppa and 2025 19 mppa forecast airport related flows for PM Peak

Inbound/ Outbound Flow	2019 PM flows (18 mppa)	2025 PM flows (19 mppa)	Difference 18 mppa/ 19mppa
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**

8.2.5 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 2025 forecast year. These targets were set out based on the statistics available at the time of the submission of the 2021 ESA which showed a significant reduction in private vehicle and Single Occupancy (SOV) travel by both passengers and staff and a shift to sustainable modes.

8.2.6 The latest statistics based on the 2021 CAA passenger survey and staff travel survey conducted in January 2022 showed a significant reversal of this trend, which can be explained by the impact of COVID-19 on the public's travel mode choices, with a preference for private car use over public transport during 2021 and to some extent during 2022. There were also some temporary measures introduced at the airport, such as allowing staff access to the multi-storey car park, thereby avoiding the need for travelling on bus shuttles from remote car parks, which likely resulted in the increased number of staff commuting in private vehicles during 2021. These measures have all now been reversed.

8.2.7 Despite the increase in private car use mode share during the COVID-19 pandemic, it is assumed that the original 2021 ESA 2024 targets can be achieved in 2025 with travel patterns returning to their pre-COVID levels. It is, however, acknowledged that the targets are challenging, and there is a level of uncertainty in relation to post COVID behaviour of the public, and its impact on mode split and traffic volumes.

8.2.8 A summary of all set targets for 2025 and how they compare with previous targets is shown in **Table 8.4**.

Table 8.4 Travel Plan targets

Target	Target 2019 (%)	Performance 2019 (%)	Target 2022 (%)	Target 2025 (%)	Impact	2021 / 2022 Survey (%)
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 2025.	75
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 2025 has been set. Impacts of DART are expected to come from taxis, thus, are excluded from this target.	53
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 2025 target.	21
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 2025 target.	25
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 2025.	10
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 2025.	10
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 2025.	6
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 2025.	17

Target	Target 2019 (%)	Performance 2019 (%)	Target 2022 (%)	Target 2025 (%)	Impact	2021 / 2022 Survey (%)
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 2025.	Not surveyed
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 2025.	1.7
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 2025.	Not surveyed
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 2025.	24%
Increase the number of organisations attending the Airport Travel Forum	10	10	12	15	An increase of 5 additional organisations has been set for 2025.	15
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 2025.	Not surveyed
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 2025.	Not surveyed

8.3 Conclusion

8.3.1 The updated assessment shows that the conclusions of the 2021 ESA remain valid. The Proposed Scheme is considered to have a very minimal impact in traffic volumes and negligible significance, with less than 4% increase in both the AM and PM peaks.

8.3.2 It is anticipated that there will be a continued 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, and promotion of 'Airport Express' services, which are both expected to come into operation during 2022. This is likely to result in a higher volume of rail patronage than that adopted in this analysis.

8.3.3 Car parking facilities currently available to LLAOL, in combination with controlled capacity and pricing, to be monitored through the new targets and action plan established in the latest Travel Plan, are expected to be sufficient for 19 mppa in line with 2025 forecasts.