Bristol Airport Limited

Development of Bristol Airport to Accommodate 12 Million Passengers Per Annum

Environmental Statement
Addendum – Main Report
(Volume 1)

Wood Group UK Limited – November 2020

Report for

Liz Higgins
Planning Manager
Bristol Airport Limited
Bristol Airport
Bristol
BS48 3DY

Main contributors

Hannah Nelson
Nick Hilton
Alex Melling
Scott Witchalls
Nick Williams
Martin Pierce
Colin Carter
Ryngan Pyper
Chris Harris
Matt Osund-Ireland

Issued by

Hannah Nelson

Hannah Nelson

Approved by

Nick Hilton

Nick Hilton

Wood

Redcliff Quay
120 Redcliff Street
Bristol BS1 6HU
United Kingdom
Tel +44 (0)117 317 8950

Doc Ref. 43002-WOOD-XX-XX-RP-O-0002_S3_1

Copyright and non-disclosure notice

Third party disclaimer

Management systems

This document has been produced by Wood Environment & Infrastructure Solutions UK Limited in full compliance with our management systems, which have been certified to ISO 9001, ISO 14001 and ISO 45001 by Lloyd's Register.

Document revisions

No.	Details	Date
1	Final version	30/11/2020

Contents

1. Introduction

1.1 Context

1.1.1 In December 2018, Bristol Airport Limited (BAL) (the 'appellant') submitted planning application reference 18/P/5118/OUT to North Somerset Council (NSC) seeking permission to expand Bristol Airport (the 'application site') beyond the permitted passenger cap of 10 million passengers per annum (mppa) to 12 mppa, and to provide the associated infrastructure necessary to accommodate this growth (the 'Proposed Development'). The description of the Proposed Development is as follows:

"*Outline planning application (with reserved matters details for some elements included and some elements reserved for subsequent approval) for the development of Bristol Airport to enable a throughput of 12 million terminal passengers in any 12 month calendar period, comprising: 2no. extensions to the terminal building and canopies over the forecourt of the main terminal building; erection of new east walkway and pier with vertical circulation cores and pre-board zones; 5m high acoustic timber fence; construction of a new service yard directly north of the western walkway; erection of a multi-storey car park north west of the terminal building with five levels providing approximately 2,150 spaces; enhancement to the internal road system including gyratory road with internal surface car parking and layout changes; enhancements to airside infrastructure including construction of new eastern taxiway link and taxiway widening (and fillets) to the southern edge of Taxiway GOLF; the year-round use of the existing Silver Zone car park extension (Phase 1) with associated permanent (fixed) lighting and CCTV; extension to the Silver Zone car park to provide approximately 2,700 spaces (Phase 2); the provision of on-site renewable energy generation; improvements to the A38; operating within a rolling annualised cap of 4,000 night flights between the hours of 23:30 and 06:00 with no seasonal restrictions; revision to the operation of Stands 38 and 39; and landscaping and associated works.*"

1.1.2 The planning application was accompanied by an Environmental Statement (ES)[1] prepared in accordance with the Town and Country Planning (Environmental Impact Assessment) Regulations 2017[2] (hereafter referred to as the 'EIA Regulations'). Two requests for further information were subsequently made by NSC under Regulation 25 of the EIA Regulations to which BAL provided considered and detailed responses in April 2019[3] and October 2019[4] respectively. The additional information provided by BAL in response to these requests did not result in any changes to the findings of the ES in terms of the assessment of likely significant effects.

1.1.3 The planning application was refused by NSC on 19 March 2020 and on 10 September 2020, BAL made an appeal to the Planning Inspectorate, pursuant to Section 78 of the Town and Country Planning Act 1990.

1.1.4 This ES Addendum is being submitted to inform BAL's appeal and is supplementary information which should be read alongside the original ES (December 2018) provided with the planning application.

[1] Wood (2018) Development of Bristol Airport to Accommodate 12 Million Passengers Per Annum: Environmental Statement.
[2] The Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (SI 2017/571). Available from http://www.legislation.gov.uk/uksi/2017/571/contents/made [Accessed October 2020].
[3] Wood (2019) Response to Request for Further Information Pursuant to Regulation 25 of The Town and Country Planning (Environmental Impact Assessment) Regulations 2017, April 2019.
[4] BAL (2019) Response to Request for Further Information Pursuant to Regulation 25 of The Town and Country Planning (Environmental Impact Assessment) Regulations 2017, October 2019.

1.2 Purpose of the ES Addendum

1.2.1 The supplementary information provided in this ES Addendum constitutes 'other information' pursuant to Regulation 21 of the EIA Regulations – 'Provision of copies of environmental statements, any other information and further information for the Secretary of State on referral or appeal'. However, as the original ES remains substantially complete and up to date, there is no need to replace it in its entirety for the purpose of the appeal. Instead, the original ES and ES Addendum should be read together. A summary of the conclusions of the ES Addendum compared to the original ES is presented in **Chapter 12** of this document.

1.2.2 The global COVID-19 pandemic has particularly affected the aviation sector and, like other UK airports, passenger throughout at Bristol Airport has been temporarily suppressed. As a result, passenger and traffic forecasts that informed the 12 mppa planning application and provided the basis for the original ES have been updated in order to consider the effect of the pandemic and address the uncertainties associated with the rate at which demand will return. A description of the updated passenger and traffic forecasts is provided in **Chapter 3: Scheme Need and Alternatives** which references the Passenger Traffic Forecast Report[5] provided separately as part of the appeal documentation.

1.2.3 The assessment contained in the original ES and the conclusions regarding the likely significance of effects of the Proposed Development have been reviewed to ensure they remain robust in light of the updated forecasts. **Chapter 4: Scope of the Assessment** of the ES Addendum identifies those topics for which updates to the passenger and traffic forecasts are relevant to the assessment, as well as those topics where the assessment remains unaffected by any update to the forecasts. This ES Addendum presents the supplementary assessments and conclusions in respect of those topics for which the updated forecasts are relevant to the assessment.

1.2.4 It should be noted that the description of the Proposed Development provided in **Chapter 2: Description of the Proposed Development** of the original ES remains unchanged. The construction programme has been updated to reflect the delay in obtaining permission and is provided in **Appendix 1A** of the ES Addendum.

1.2.5 An updated glossary of terms is provided in **Appendix 1B,** and an updated list of abbreviations is provided in **Appendix 1C** of the ES Addendum to assist understanding of the terms used in the ES Addendum.

1.3 The appellant and the project team

1.3.1 The ES Addendum has been prepared on behalf of the appellant, BAL, by Wood with the support of a wider team of specialists. The EIA project team remains unchanged and the statements regarding competent expertise provided in the original ES remain valid.

1.4 Access to the ES Addendum

1.4.1 The ES Addendum is available via the Government's Appeals Casework portal. Hard copies of the NTS Addendum are available free of charge. Hard copies of the ES (Volume I) and Technical Appendices (Volume II) can be purchased at a cost of £50.00 and £75.00 respectively (excluding postage and packaging) or on CD ROM for a cost of £5.00. Hard copies and CDs should be requested via Yourairport@bristolairport.com. mailto:liz.higgins@bristolairport.com

[5] York Aviation (2020) Passenger Traffic Forecasts for Bristol Airport to Inform the Proposed Development to 12 mppa.

1.4.2 An electronic copy of all application documents will be available to view via NSC's website https://planning.n-somerset.gov.uk/online-applications/.

1.5 Non-Technical Summary

1.5.1 A Non-Technical Summary Addendum has been prepared to summarise the findings of the supplementary information presented in this ES Addendum. This should be read alongside the original Non-Technical Summary (December 2018).

2. Legislative and Policy Updates

2.1.1 **Chapter 5: Legislation and policy overview** of the original ES set out the overarching legislative and policy context for the Proposed Development. Since the preparation of the original ES, there have been a small number of changes to this legislation and policy which are summarised in the sub-sections below as an update to Chapter 5; however, in this instance, the changes do not alter the conclusions of the original ES.

2.1.2 It should be noted that legislative and policy changes specific to the topics scoped into the ES Addendum are considered in **Chapters 5 to 11**, where appropriate.

2.2 Legislative context

2.2.1 There have been no relevant changes to the overarching legislation for EIA since the preparation of the original ES.

2.3 National planning policy

2.3.1 On 19 February 2019, the Ministry of Housing, Communities and Local Government (MHCLG) published an update[6] to the 2018 revised National Planning Policy Framework (NPPF). The changes to the NPPF concerned housing supply and habitats development and are not material to the conclusions of the original ES.

2.4 National aviation policy

2.4.1 Beyond the Horizon - The Future of UK Aviation: Making Best Use of Existing Runways (June 2018)[7] (hereafter referred to as 'Making Best Use') was not considered in the original ES. Making Best Use confirms the Government's support for airports beyond Heathrow making best use of their existing runways, subject to consideration of economic and environmental impacts. It states (at paragraph 1.29):

"*Therefore, the Government is supportive of airports beyond Heathrow making best use of their existing runways. However, we recognise that the development of airports can have negative as well as positive local impacts, including on noise levels. We therefore consider that any proposals should be judged by the relevant planning authority, taking careful account of all relevant considerations, particularly economic and environmental impacts and proposed mitigations. This policy statement does not prejudge the decision of those authorities who will be required to give proper consideration to such applications. It instead leaves it up to local, rather than national government, to consider each case on its merits.*"

[6] Ministry of Housing, Communities and Local Government (2019) *National Planning Policy Framework*. Available from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/810197/NPPF_Feb_2019_revised.pdf [Accessed October 2020].

[7] HM Government (2018) *Beyond the Horizon – The Future of UK Aviation: Making Best Use of Existing Runways*. Available from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/714069/making-best-use-of-existing-runways.pdf [Accessed October 2020].

2.4.2 In December 2018, the Government published its Green Paper, Aviation Strategy 2050: The Future of UK Aviation ('Aviation 2050')[8]. Aviation 2050 supports the growth of regional airports such as Bristol as a catalyst for regional economic development and connectivity and reaffirms the Government's making best use policy. At paragraph 4.4, it states:

"*Airports have a crucial role to play in their regions. They are hubs for growth within and beyond the region in which they are situated. Local airports, such as Newquay, Norwich and Prestwick serve their immediate catchment area, offering domestic and short-haul destinations. Regional airports, such as Bristol, Belfast International, Newcastle and Glasgow, serve larger catchments and offer extensive short-haul network and some key long-haul routes, providing their regions with access to global markets*."

2.4.3 Whilst Making Best Use and Aviation 2050 support the need for the Proposed Development, they do not materially affect the conclusions of the original ES.

2.4.4 In February 2020, the Court of Appeal gave judgement in the challenges brought by Friends of the Earth and Plan B Earth to the designation of the Airports National Policy Statement (ANPS)[9]. The Order of the Court was that the ANPS is of no legal effect unless and until the Secretary of State has undertaken a review of it in accordance with the relevant provisions of the Planning Act 2008. The Supreme Court heard an appeal by Heathrow Airport Ltd against the Court of Appeal's decision on 7 – 8 October 2020 and the outcome of the appeal is awaited. The ANPS is currently, therefore, of no legal effect pending review by the Secretary of State and / or a reversal of the Court of Appeal's decision by the Supreme Court.

2.4.5 The ANPS concerns airport development in the South East of England and the decision of the Court of Appeal does not, therefore, materially affect the conclusions of the original ES.

2.5 Sub-regional policy

2.5.1 The four West of England councils (Bath and North East Somerset, Bristol City, North Somerset, and South Gloucestershire) submitted the West of England Joint Spatial Plan Publication Document (JSP)[10] to the Secretary of State for examination in April 2018. The plan set out proposals for future development in order to meet the region's housing, employment and transport needs to 2036.

2.5.2 In July 2019, examination hearings on the JSP were held. The appointed Inspectors concluded there were fundamental concerns about the soundness of the plan and on 7 April 2020, the four councils wrote to the Inspectors[11] to confirm the withdrawal of the JSP from examination. In consequence, the JSP no longer has any material weight in decisions concerning development at Bristol Airport; however, the withdrawal of the JSP does not materially affect the conclusions of the original ES.

---

[8] HM Government (2018) *Aviation Strategy 2050: The Future of UK Aviation*. Available from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/769695/aviation-2050-web.pdf [Accessed October 2020].

[9] Department for Transport (2018) *Airports National Policy Statement: new runway capacity and infrastructure at airports in the South East of England*. Available from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/858533/airports-nps-new-runway-capacity-and-infrastructure-at-airports-in-the-south-east-of-england-web-version.pdf#:~:text=%20%20%20Title%20%20%20Airports%20National,Created%20Date%20%20%206%2F6%2F2018%208%3A58%3A28%20AM%20 [Accessed October 2020].

[10] West of England Partnership (2017). West of England Joint Spatial Plan Publication Document.

[11] Letter from Lisa Bartlett to Inspectors Rivett and Lee dated 7 April 2020. Available from http://www.hwa.uk.com/site/wp-content/uploads/2019/04/WoE-letter-to-Inspectors-7-April-2020-3.pdf [Accessed October 2020].

2.5.3 The Joint Local Transport Plan 4 2020-2036 (JLTP4)[12] was published in March 2020. It recognises the growth aspirations of Bristol Airport and seeks to maximise the airport's transport connectivity as a local, sub-regional and regional transport interchange. However, the proposals contained in JLTP4 do not materially affect the Proposed Development nor the conclusions of the original ES.

2.6 Local policy

2.6.1 NSC has commenced preparation of a new Local Plan for the period 2023 to 2038. Consultation on the Challenges for the Future[13] document took place between 22 July and 02 September 2020 and this set out that the Local Plan will need to address the requirements of Bristol Airport. A further consultation, Choices for the Future[14], commenced on 02 November and is due to close on 14 December 2020. This considers broad locations for housing and employment through to 2038 and identifies the opportunity to explore employment provision associated with Bristol Airport and future mass transit links to the airport site. However, detailed policy proposals have not yet been set out and the new Local Plan will not be adopted at the time the appeal is determined. In consequence, the emerging new Local Plan does not materially affect the conclusions of the original ES.

[12] Travelwest (2020) *Joint Local Transport Plan 4 2020-2036*. Available from https://s3-eu-west-1.amazonaws.com/travelwest/wp-content/uploads/2020/04/Adopted-Joint-Local-Transport-Plan-4.pdf [Accessed October 2020].

[13] North Somerset Council (2020) *North Somerset Local Plan 2038 Challenges and Choices Part 1: Challenges for the Future*. Available from https://www.n-somerset.gov.uk/sites/default/files/2020-07/Local%20Plan%202038%20-%20Challenges%20for%20the%20Future.pdf [Accessed October 2020].

[14] North Somerset Council (2020) *North Somerset Local Plan 2038 Challenges and Choices Part 2: Choices for the Future*. Available from http://www.n-somerset.gov.uk/sites/default/files/2020-11/North%20Somerset%20Local%20Plan%202038%20challenges%20and%20choices%20part%20two%20-%20Choices%20for%20the%20future.pdf [Accessed November 2020].

3. Scheme Need and Alternatives

3.1 Introduction

3.1.1 This chapter of the ES Addendum supplements the information provided in **Chapter 3: Scheme need and alternatives** of the original ES.

3.2 Need for the Proposed Development

3.2.1 **Chapter 3** of the original ES established that the need for the Proposed Development is influenced by the following:

- demand factors demonstrated by forecast passenger growth and aircraft (traffic) movements;
- the economic importance of Bristol Airport and the wider aviation sector to the local and regional economy; and
- policy support for airport growth and making the best use of existing airport capacity.

3.2.2 These factors are re-affirmed in-turn below, drawing on more recently available information where appropriate.

Passenger and traffic growth forecasts

3.2.3 In 2019, Bristol Airport handled 8.96 million passenger per annum (mppa)[15], making it the fourth largest regional airport in the UK. At the time of the planning application, the forecasts prepared by BAL and independently verified by Mott MacDonald[16] indicated that passenger demand would reach 10 mppa by 2021 and 12 mppa by 2026.

3.2.4 The onset of the global COVID-19 pandemic has significantly impacted the aviation sector and passenger throughput at Bristol Airport has temporarily fallen. However, it is expected that demand will return as travel restrictions are lifted, passenger confidence returns, and the economy recovers from the pandemic. Global passenger forecasts prepared by the International Air Transport Association (IATA)[17] show that, internationally, traffic is expected to return to pre-pandemic levels by 2024 with recovery in the short haul market likely to be faster. The Airports Council International (ACI) has made a similar projection[18].

3.2.5 Due to the COVID-19 pandemic, its impact on the aviation sector and temporarily suppressed passenger demand at Bristol Airport, York Aviation Limits (YAL), on behalf of BAL, has updated the passenger demand forecasts[19] for the Proposed Development. It uses a forecast model that combines a 'bottom up' market intelligence driven assessment and an econometric model of demand growth and passenger behaviour, which includes a probability based approach to modelling uncertainty in the inputs to the econometric model.

---

[15] Civil Aviation Authority (2020) *Size of Reporting Airports*. Available from https://www.caa.co.uk/uploadedFiles/CAA/Content/Standard_Content/Data_and_analysis/Datasets/Airport_stats/Airport_data_2019_annual/Table_01_Size_of_UK_Airports.pdf [Accessed October 2020].

[16] Mott MacDonald (2018) *Bristol Airport – Forecast Validation*.

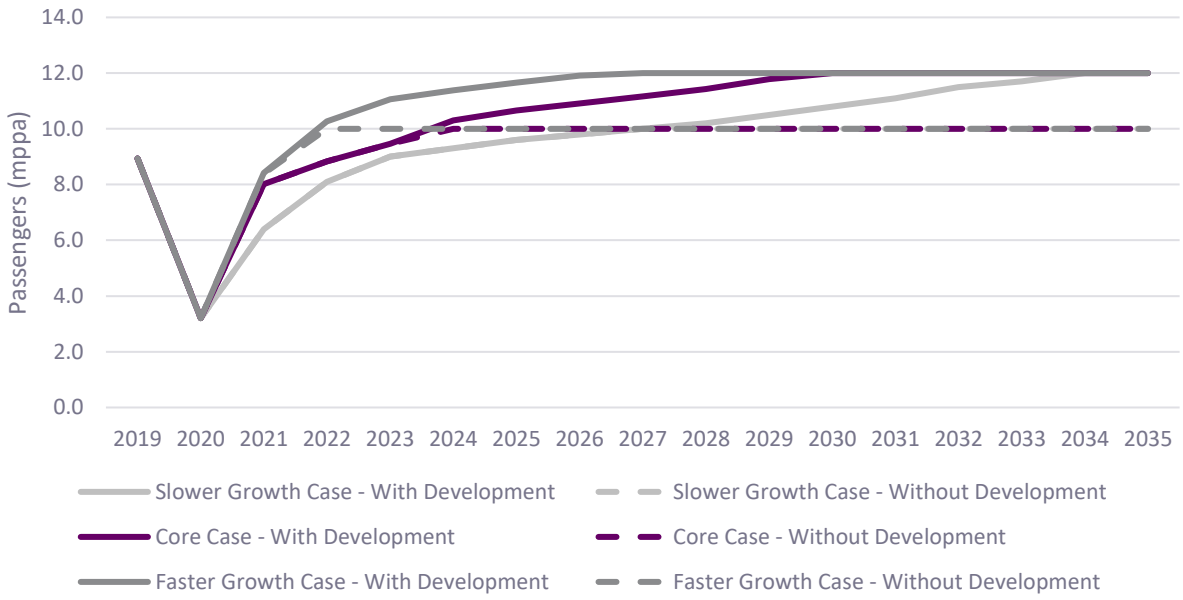
[17] IATA (2020) https://www.iata.org/en/pressroom/2020-09-01-01/ [Accessed October 2020].

[18] ACI (2020) https://store.aci.aero/wp-content/uploads/2020/08/COVID19-4th-Economic-Impact-Advisory-Bulletin.pdf [Accessed October 2020].

[19] York Aviation (2020) *Passenger Traffic Forecasts for Bristol Airport to Inform the Proposed Development to 12 mppa*.

3.2.6 The updated passenger demand forecasts have considered a range of different cases for future growth at Bristol Airport (see **Figure 3.1**). The Core Case, which has been taken forward for assessment, indicates that passenger demand will reach 10 mppa in around 2024, increasing to 12 mppa in 2030. The updated passenger demand forecasts also identify a reasonable Faster Growth Case and Slower Growth Case for sensitivity testing. The Faster Growth Case sees Bristol Airport reach 10 mppa in 2022 and 12 mppa in 2027. The Slower Growth Case sees 10 mppa reached in 2027 and 12 mppa in 2034. Both the Faster and Slower Growth Cases are also considered in this ES Addendum. These sensitivity cases are considered, qualitatively, in the assessments presented in **Chapters 5 to 11**, to determine whether reaching 12 mppa faster or slower than the Core Case materially affects the conclusions of ES Addendum in terms of the significant environmental effects of the Proposed Development.

Figure 3.1 Passenger Demand Forecasts by Case to 12 mppa



3.2.7 In terms of air traffic movements (ATMs), the updated forecasts show that there will be growth from 61,382[20] ATMs in 2019 to around 75,500 annual commercial ATMs at 12 mppa in 2030. It should be noted that the forecast number of ATMs at 2030 represents a decrease of around 8,300 annual ATMs in comparison to the original forecasts. This decrease in the number of forecast ATMs reflects a rise in the forecast average number of passengers per movement which, in-turn, is driven by an increase in the average size of aircraft operating from Bristol Airport and higher load factors (the percentage of seats filled on every flight).

3.2.8 Overall, the updated forecasts demonstrate that there remains demand for additional capacity at Bristol Airport despite the short-term impacts of the COVID-19 pandemic and, therefore, the need for the Proposed Development is unaffected. The Core Case indicates that Bristol Airport will reach 10 mppa in around 2024 and 12 mppa in around 2030. This suggests that Bristol Airport will need to provide greater capacity from around 2024.

[20] Adjusted for Air Taxis and Positioning Movements for consistency with the ATM forecasts.

Bristol Airport as a driver of regional economic growth

3.2.9 The economic need for the Proposed Development has not changed. An addendum[21] to the Economic Impact Assessment submitted as part of the planning application has been prepared by YAL. This estimates that at 2030 (with a passenger throughput of 12 mppa):

- The economic footprint of Bristol Airport within North Somerset will increase by £50 million (in Gross Value Added (GVA) terms), supporting approximately 530 additional jobs (430 Full-time Equivalents (FTEs). When wider benefits are also included, this is likely to increase to £70 million (in GVA terms) and around 710 additional jobs (570 FTEs);
- The economic footprint of Bristol Airport within the West of England will increase by £100 million (in GVA terms), supporting around 1,220 additional jobs (1,040 FTEs). When wider benefits are also included, this is anticipated to increase to £220 million (in GVA terms) and around 2,460 additional jobs (2,040 FTEs); and
- The economic footprint of Bristol Airport within the South West region and South Wales will increase by £150 million (in GVA terms), supporting circa 2,120 additional jobs (1,750 FTEs). When wider benefits are also included, this is anticipated to increase to £430 million (in GVA terms) and around 5,560 additional jobs (4,470 FTEs).

3.2.10 The findings of the Economic Impact Assessment Addendum supersede those previously reported in the original ES and are discussed further in **Chapter 8: Socio-economics**. Overall, there are some differences in the economic impacts now reported compared to original ES that relate to changes in the composition of the traffic forecasts, productivity assumptions and the passage of time between 2026 and 2030. However, overall, the benefits of the Proposed Development remain substantial.

3.2.11 Ensuring that Bristol Airport is able to meet current and forecast passenger demand is essential if the economic benefits outlined above are to be realised and for the airport to continue to fully support local, regional and national economic growth.

Policy support for airport growth and making the best use of existing capacity

3.2.12 Chapter 3 of the original ES established that national aviation policy, as set out in the Aviation Policy Framework (APF)[22], supports the growth of regional airports and making the best use of existing airport capacity including at Bristol Airport.

3.2.13 Since submission of the planning application in December 2018, there has not been any change to the Government's aviation policy of making the best use of existing airport capacity and its support for regional airports. Indeed, as set out in **Section 2.4**, emerging national aviation policy contained in Aviation 2050[23] also supports the growth of regional airports as a catalyst for regional economic development and connectivity and reaffirms the Government's making best use policy. At paragraph 4.4, Aviation 2050 states:

"*Airports have a crucial role to play in their regions. They are hubs for growth within and beyond the region in which they are situated. Local airports, such as Newquay, Norwich and Prestwick serve their immediate catchment area, offering domestic and short-haul destinations. Regional airports, such as*

[21] York Aviation (2020) Development of Bristol Airport to Accommodate 12 Million Passengers Per Annum: Economic Impact Assessment Addendum.
[22] HM Government (2013) Aviation Policy Framework. Available from https://www.gov.uk/government/publications/aviation-policy-framework [Accessed October 2020].
[23] HM Government (2018) Aviation Strategy 2050: The Future of UK Aviation. Available from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/769695/aviation-2050-web.pdf [Accessed October 2020].

Bristol, Belfast International, Newcastle and Glasgow, serve larger catchments and offer extensive short-haul network and some key long-haul routes, providing their regions with access to global markets."

3.2.14 The Proposed Development therefore continues to support national aviation policy by making the best use of the existing airport, increasing the South West region's connectivity and by delivering substantial economic benefits.

3.3 Consideration of alternatives

3.3.1 The original ES considered three types of alternatives: 'Do nothing', where the Proposed Development is not progressed; strategic alternatives to meeting demand for airport growth; and design/layout alternatives in the context of the design evolution.

3.3.2 The alternatives considered in the original ES were all rejected, the reasons for their rejection remain and no further alternatives have been identified. In summary:

- **'Do nothing' alternative**: Under a 'Do nothing' alternative, the growth of Bristol Airport would be capped at 10 mppa, in accordance with the extant planning consent. As a result, there would be no further growth beyond this number of passengers (which is now forecast to be reached in 2024). As outlined in **Section 3.2** above, despite the impact of the COVID-19 pandemic on the aviation sector, the updated passenger and traffic forecasts demonstrate that there remains an acute need to provide additional capacity at Bristol Airport. The 'Do nothing' option would not reflect this projection and passenger demand would therefore not be met. This would constrain investment at the airport, see economic activity displaced from the South West, act as a barrier to overseas investment and result in a reduction in regional connectivity. In consequence, the rationale for rejecting this alternative as set out in the original ES remains.
- **Strategic alternatives**: The original ES described the strategic alternatives considered by BAL concerning the level or quantum of passenger growth to be accommodated (i.e. growth above or below a passenger throughput of 12 mppa) and alternative locations for the delivery of additional airport capacity. In terms of the first alternative (the quantum of growth), BAL maintains that 12 mppa is the optimum capacity for the Proposed Development taking into account national aviation policy, on-site capacity, highways capacity, airspace and the forecast economic benefits associated with increasing the capacity of the airport. This conclusion is not affected by the updated passenger and traffic forecasts, which demonstrate that there is still strong demand for additional capacity at Bristol Airport. Therefore, the reasons for rejecting alternative growth proposals set out in the original ES remain.

  Regarding alternative locations for the delivery of additional capacity, BAL maintains that Bristol Airport is the most appropriate location for meeting regional passenger demand and clawing back leakage of passengers from London airports. The provision of additional runway capacity at Heathrow has been delayed and is now not likely to be delivered before around 2033 at the earliest. Gatwick is continuing to explore the potential for additional runway capacity, but this is unlikely to be delivered before 2028 at the earliest. The situation at the other competing airports has not changed significantly. The justification for rejecting alternative growth locations set out in the original ES is, therefore, still valid.
- **On-site alternatives**: The original ES set out the alternative on-site options considered by BAL in developing its proposals for a 12 mppa capacity airport. This included alternatives relating to the terminal building extensions, passenger car parking and highway improvements. No further reasonable alternatives have been identified and considered by BAL since the preparation of the original ES and in consequence, the preferred options taken forward remain unchanged.

With specific regard to car parking, BAL is aware that a planning application[24] was submitted by a third party for a proposed park and ride facility near Junction 21 of the M5. This proposal was promoted by the third party as an alternative to the Silver Zone Car Park (Phase 2) extension; however, the planning application was withdrawn by the applicant. BAL also understands that a request for a scoping opinion[25] has been submitted to NSC for a proposed park and ride facility adjacent to Heathfield Park, Hewish. The proposed park and ride facility site is remote from the airport (circa 7km distance) and is not owned by BAL such that the proposed facility has the potential to undermine delivery of the objectives of BAL's Airport Surface Access Strategy (ASAS). Further, the scheme does not currently have planning permission. Neither of these alternatives are considered to be reasonable. Nonetheless, given the recent EIA Scoping Request, the Heathfield Park proposal has been included in the cumulative effects assessment (**Chapter 11**).

[24] Application reference 19/P/0704/FUL.
[25] Reference 20/P/2082/EA2.

4. Scope of the ES Addendum

4.1 Scope of the ES Addendum

4.1.1 The original ES assessment and conclusions have been reviewed to take into account the updated passenger and traffic forecasts outlined in **Chapter 3: Project Need and Alternatives**. Only those assessments on which the forecasts are relevant have been considered in the ES Addendum. On this basis, supplementary information has therefore been provided in relation to the following topics chapters:

- **Chapter 5: Traffic and Transport**;
- **Chapter 6: Noise and Vibration;**
- **Chapter 7: Air Quality;**
- **Chapter 8: Socio-economics**;
- **Chapter 9**: **Human Health;**
- **Chapter 10: Carbon and Greenhouse Gases;** and
- **Chapter 11: Cumulative Effects Assessment.**

4.1.2 These topics have been included in the ES Addendum as the respective assessments and conclusions regarding the significant effects of the Proposed Development may be affected by the updated passenger and traffic forecasts for Bristol Airport. The rationale for scoping out the remaining ES topics is provided in **Section 4.2**.

4.1.3 Each topic chapter in the ES Addendum includes:

- Confirmation on how the scope of the assessment has changed in light of the updated forecasts and a Core Case of reaching 12 mppa in 2030;
- An updated assessment of operational effects;
- Sensitivity testing on a qualitative basis in order to consider the implications of the Faster Growth Case (reaching 12 mppa in 2027) and Slower Growth Case (reaching 12 mppa in 2034) (described in **Section 3.2)** compared to the Core Case (2030) assessed in **Chapters 5 – 11** of the ES Addendum;
- An evaluation of the likely significance of effects of the Proposed Development in comparison to the original ES.

4.1.4 Unless explicitly stated in **Chapters 5 – 11** of the ES Addendum, the following remaining aspects of the topic chapters in the original ES have not materially changed:

- Limitations of the assessment;
- Relevant legislation, planning policy and guidance;
- Data gathering methodology;
- Overall baseline;
- Consultation;
- Environmental measures embedded into the development proposals;

- Assessment methodology; and
- Assessment of construction effects.

4.1.5 The overarching approach to the EIA presented in **Chapter 4: Approach to Assessment** of the original ES remains unchanged.

4.2 Topics scoped out of the ES Addendum

Construction

4.2.1 The delay to the start of construction (see Updated Construction Programme in **Appendix 1C**) has not materially affected the original assessment of construction effects because there are no changes to the construction activities, methodology or the embedded construction phase mitigation outlined in the original ES. Nonetheless, each topic chapter included within the ES Addendum has re-confirmed the original assessment conclusions for clarity.

Operation

4.2.2 The updated passenger and traffic forecasts do not underpin the assessment of landscape and visual; land quality; biodiversity; surface water and flood risk; groundwater; and historic environment. These assessments are therefore not revisited in this ES Addendum. **Table 4.1** below sets out the reasons for scoping these topics out of the ES Addendum.

Table 4.1 Scope of ES Addendum

Topic (Original ES 2018)	Original conclusion of significance (Original ES 2018)	Change in significance of effects (November 2020)
Chapter 9: Landscape and Visual	No significant adverse landscape effects were identified in the original assessment (see summary in **Table 9.10** in **Chapter 9** of the original ES). A summary of significance of visual effects is presented in **Table 9.11** in **Chapter 9** of the original ES. This confirmed that the majority of visual receptors would not experience significant effects as a result of the proposed development with the exception of 'Melody Cottage' which is anticipated to experience moderate and significant effects in Year 1. by year 15 the visual effect would be not significant due to the effects of screening.	None. The updated passenger and traffic forecasts will not alter the nature or scale of the physical infrastructure proposed as part of the development and no changes to the mitigation and enhancement measures identified in the ES are proposed. In consequence, no changes to the significance of landscape or visual effects identified in the original ES will occur.
Chapter 10: Land Quality	No significant effects on humans, property, controlled waters or soil were identified in the original ES (see summary in **Table 10.10** of **Chapter 10** of the original ES).	None. The updated passenger and traffic forecasts will not alter the nature or scale of the physical infrastructure proposed as part of the development or the proposed mitigation measures and, therefore, there is no change to the significance of effects on land quality during operation reported in the original ES.

Topic (Original ES 2018)	Original conclusion of significance (Original ES 2018)	Change in significance of effects (November 2020)
Chapter 11: Biodiversity	No significant effects on biodiversity were identified in the original ES; however, the conclusion in relation to the effects on Greater and Lesser Horseshoe bats in their own right and as qualifying features of the North Somerset and Mendip Bat Special Area of Conservation (SAC) is reliant on the delivery of replacement off-site bat habitat in compliance with the North Somerset and Mendip Bat SAC Supplementary Planning Document (SPD) (see **Section 11.17** in **Chapter 11** of the original ES).	None. The updated passenger and traffic forecasts will not alter the nature or scale of the physical infrastructure proposed as part of the development nor operation of the airport and, therefore, effects on biodiversity including habitat loss will remain the same. No changes to the mitigation and enhancement measures identified in the ES are proposed including the commitment to deliver replacement off-site habitat, beyond an additional commitment to translocate small areas of grassland, as agreed with NSC officers. As such, there is no change to the significance of the effects during operation reported in the original ES.
Chapter 12: Surface Water and Flood Risk	No significant effects were identified in relation to the impact of the Proposed Development on the aquatic environment (surface water), water resources, or flood risk (see **Table 12.14** in **Chapter 12** of the original ES).	None. The updated passenger and traffic forecasts will not alter the nature or scale of the physical infrastructure proposed as part of the development or the proposed mitigation measures and, therefore, there is no change to the significance of effects on surface water and flood risk during operation reported in the original ES.
Chapter 13: Groundwater	No significant effects were identified in relation to the impact of the Proposed Development on groundwater, including the principal aquifer (the Chelvey Well Public Water Supply) and springs or baseflow to surface water (see **Table 13.13** in **Chapter 13** of the original ES).	None. The updated passenger and traffic forecasts will not alter the nature or scale of the physical infrastructure proposed as part of the development or the proposed mitigation measures and, therefore, there is no change to the significance of effects on groundwater during operation reported in the original ES.
Chapter 14: Historic Environment	No significant effects were identified in relation to the impact of the Proposed Development on heritage assets, including Windmill House Grade II Listed Building, and the Scheduled Monuments located in the study area (see **Table 14.13** in **Chapter 14** of the original ES).	None. The updated passenger and traffic forecasts will not alter the nature or scale of the physical infrastructure proposed as part of the development or the proposed mitigation measures and, therefore, there is no change to the significance of effects on the historic environment during operation reported in the original ES.

5. Traffic and Transport

5.1 Introduction

5.1.1 This chapter of the ES Addendum supplements **Chapter 6: Traffic and Transport** of the original ES (December 2018) and should be read in conjunction with this.

5.1.2 The original ES submitted in 2018 as part of the planning application (LPA ref. no. 18/P/5118/OUT) included a Traffic and Transport chapter which assessed the effects experienced on the highway as a result of the Proposed Development for the 2026 Assessment Year (year at which 12 mppa was forecast to be reached at the time of the planning application). **Chapter 6: Traffic and Transport** of the original ES concluded the following:

- Changes in traffic flows experienced on the highway as a result of the Proposed Development were predicted to be small, with less than 10% increases in the number of total daily vehicles and less than 2% increases in Heavy Good Vehicles (HGVs).
- Effects on severance, pedestrian and cyclist delay and amenity, and fear and intimidation were anticipated to be negligible or minor adverse and not significant.
- No significant effects were predicted as a result of driver delay times at any of the assessed junctions, and significant beneficial effects were noted where highway improvements were proposed as part of the development.
- No specific concerns regarding the geometric design or road layout of the local highway network in respect to accidents and safety were identified.
- No significant effects were anticipated during the construction phase due to the relatively low flows associated with this phase and the implementation of a Construction Environmental Management Plan (CEMP) to reduce potential adverse effects on the local highway network.

5.1.3 The supplementary information presented in this chapter takes account of the following:

- Updated baseline passenger numbers (to account for the actual 2018 passenger throughput of 8.6 mppa instead of 2017 levels, i.e. 8.2 mppa, considered as part of the original ES);
- Updated passenger forecasts;
- Updated employee forecasts;
- Change in Assessment Year from 2026 to 2030 (year in which 12 mppa will be reached). 2030 is the Core Case assessed within this chapter; and
- A Faster Growth Case (where 12 mppa is reached in 2027) and a Slower Growth Case (where 12 mppa is reached in 2034) in comparison to the Core Case.

5.1.4 These changes mean that it has been necessary to update the transport assessment. A Transport Assessment (TA) was submitted with the planning application and, subsequently, a Supplementary Document was issued during determination. An Addendum to the Transport Assessment (TAA) has now been prepared to account for the above changes (see **Appendix 5A**). The quantitative assessment in the TAA is based on the Core Case of 2030. Consideration has also been given to the range of uncertainty in the Assessment Year, and qualitative assessments of the Faster and Slower Growth Cases (Assessment Years of 2027 and 2034) have been carried out.

5.1.5 The original TA and Supplementary Document were prepared in consultation with North Somerset Council (NSC) and Highways England (HE). Engagement with Bristol City Council (BCC) and Bath and North-East Somerset (BaNES) also informed, where appropriate, the approach applied in the TA.

5.1.6 The TAA is consistent with the methodology agreed with NSC and HE, but is based on the updated forecasts. The TAA is appended to this ES Addendum (refer to **Appendix 6A**).

5.1.7 This chapter has been prepared on the basis of the detailed assessment reported in the TAA and assesses the significant effects of the Proposed Development arising from the changes associated with the proposed 12 mppa application over and above the permitted 10 mppa cap.

Limitations of the assessment

5.1.8 No further limitations to those identified in the original ES have been identified as part of this assessment.

5.2 Relevant legislation, planning policy, technical guidance

Legislative context

5.2.1 This section is unchanged from the original ES.

Planning policy context

5.2.2 **Table 5.1** below identifies any changes to policy directly applicable to this topic since the original ES was prepared, in addition to policy referenced in **Chapter 5: Legislative and policy overview.**

Table 5.1 Relevant policies and their implications for traffic and transport

Policy reference	Implications
National Planning Policy Framework (NPPF) 2019[26]	
Chapter 9	This chapter relates to promoting sustainable transport and the importance of considering transport issues from an early stage in the development of a planning proposal.
Paragraph 109	States that "*development should only be prevented or refused on highways grounds if there would be an unacceptable impact on highway safety, or the residual cumulative impacts on the road network would be severe.*"
Paragraph 111	Notes that "*All developments that will generate significant amounts of movement should be required to provide a travel plan, and the application should be supported by a transport statement or transport assessment so that the likely impacts of the proposal can be assessed*"

5.2.3 The revised NPPF presents no changes in terms of implications for traffic and transport, in comparison with the previous NPPF published in 2018. Therefore, it is concluded that there are no material changes to this document as a result of the updated NPPF.

[26] Ministry of Housing, Communities and Local Government (2019). National Planning Policy Framework, [online]. Available at: https://www.gov.uk/government/publications/national-planning-policy-framework--2

5.2.4 The Joint Local Transport Plan 4: 2020 – 2036 (West of England Partnership) was adopted in March 2020 noting that "*at the completion of the JLTP4 the West of England will be a carbon neutral community where the vast majority of vehicles on the road are decarbonised and no longer fuelled by fossil fuels. More people will have the opportunity to move around the region using affordable, high quality and frequent public transport accessing their jobs and leisure activities and delivering freight.'*

Technical guidance

5.2.5 This section is unchanged from the original ES.

5.3 Data gathering methodology

Study Area

5.3.1 No changes apply to the methodology employed in the original ES to identify the Study Area, which was agreed with NSC in the EIA Scoping Opinion.

Desk study

5.3.2 An updated desk study has been undertaken to determine baseline conditions including available public transport services, pedestrian and cyclist links, number and location of road collisions and the location of receptors.

5.3.3 A summary of the organisations that have supplied additional data, together with the nature of that data, is as follows:

- BAL:
  - Forecast flight schedules for 10 mppa and 12 mppa provided by YAL;
  - Projected staff numbers.
- CAA:
  - 2019 passenger survey results.
- Trip End Model Presentation Program (TEMPro):
  - Industry standard tool for estimating trip growth (updated to reflect the 2030 Assessment Year for the Core Case instead of 2026 considered previously).

Baseline data collection

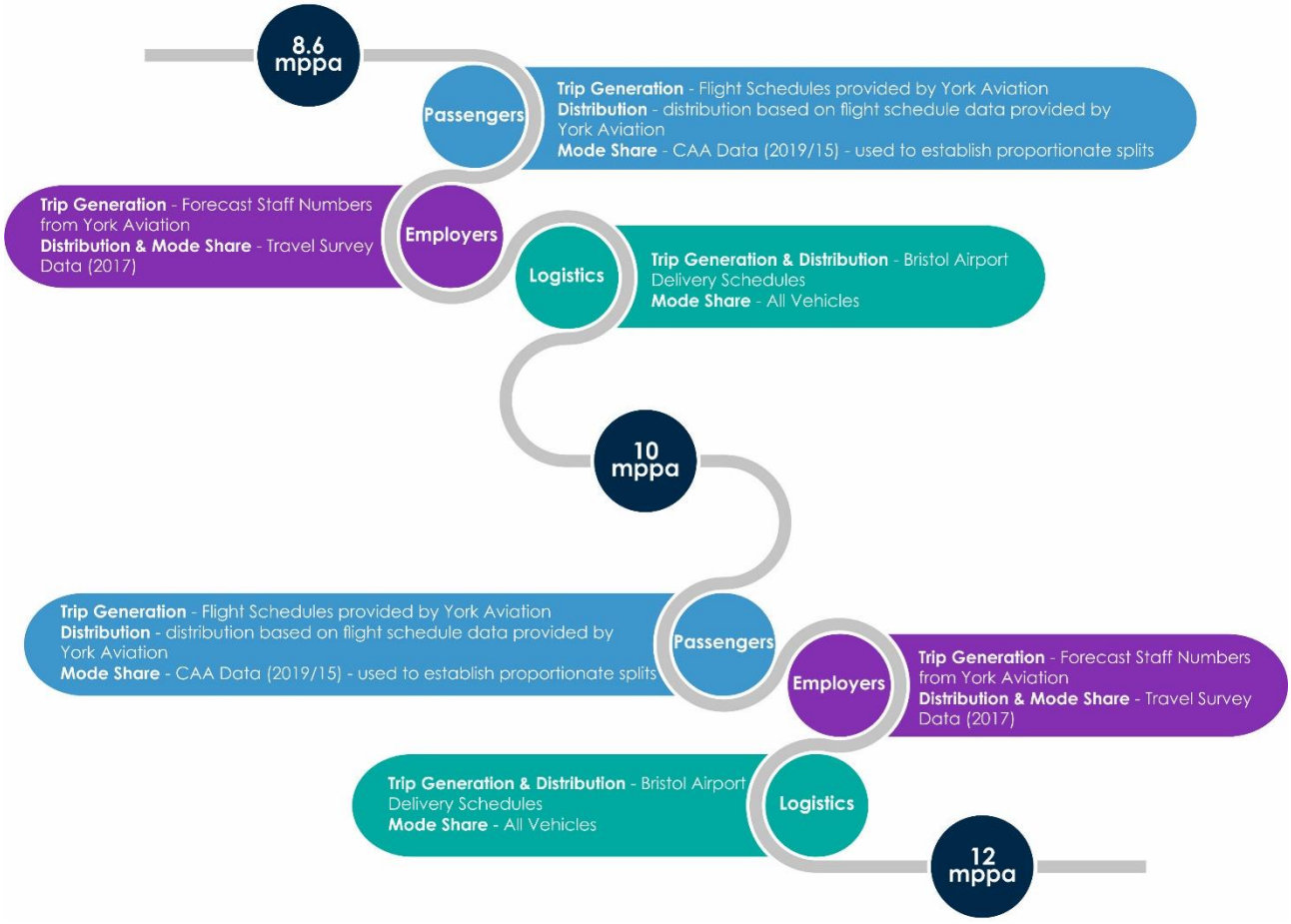
5.3.4 The baseline traffic data is unchanged from the original ES. The 2018 baseline data is therefore considered to be a suitable dataset for assessment purposes.

Future Baseline 'Without Development' (10 mppa) and 'With Development' (12 mppa) trip generation methodology

5.3.5 The same overarching approach employed in the original ES **Chapter 6: Traffic and Transport** (paragraph 6.4.31 onwards) has been applied to the Future Baseline 'Without Development' (10 mppa) and 'With Development' (12 mppa) trip generation methodology. However, the following changes should be noted:

- Growth cases: A Core Case has been quantitively assessed based on 12 mppa being reached in 2030. For the Assessment Years corresponding to the Faster and Slower Growth Cases, i.e. 2027 and 2034, a qualitative assessment has been carried out using a potential range of growth obtained from the DfT TEMPro dataset, and informed by the quantitative assessment results for 2030.
- Baseline passenger numbers: **Chapter 6: Traffic and Transport** of the original ES was based on the available 2017 baseline data in terms of passenger throughput i.e. 8.2 mppa. The baseline number of passengers assumed for this assessment has now been adjusted to reflect the actual 2018 passenger levels of 8.6 mppa. This therefore means there will be an uplift over the baseline data of 1.4 mppa to reach the consented 10 mppa level, and an uplift of 3.4 mppa to reach the 12 mppa level.
- Assessment Year: The **Chapter 6: Traffic and Transport** of the original ES assessed a 2026 Assessment Year i.e. the year when the airport was anticipated to reach 12 mppa. However, updated growth projections have resulted in a revision to the Core Case forecast Assessment Year to 2030.
- Employee numbers: Updated employee forecasts have been prepared as part of an addendum to the Economic Impact Assessment for the Proposed Development. The 2018 base remains unchanged from the original ES. The 10 mppa forecast has reduced from 3,875 to 3,625 employees, and the 12 mppa forecast has reduced from 4,575 to 4,350 employees.

Figure 5.1 Trip generation methodology – Core Case



5.3.6 The assessment focuses on the transport implications of the growth of Bristol Airport, comparing the consented 10 mppa and proposed 12 mppa.

5.3.7 Passenger trips have been calculated using a busy-day flight schedule provided by YAL, which assesses flight projections and provides the number of passengers for each flight along with their trip origin/destination. This methodology was agreed for the TA Supplementary Document and remains unchanged, although the data has been updated.

5.3.8 The daily profile of passengers has been distributed using the flight forecast data provided by YAL and this has been adjusted using terminal 'dwell time' information – i.e. the amount of time passengers spend inside the Bristol Airport terminal before or after a flight to determine the surface transport trip time.

5.3.9 Mode share has been based on a target of 15% by public transport for the 1.4 mppa uplift to 10 mppa and 17.5% for the 3.4 mppa uplift up to 12 mppa. The 15% modal share target (at 10 mppa) is set out in the Section 106 Agreement for the 10 mppa planning permission whilst the 17.5% target is consistent with that agreed with NSC officers in respect of the 12 mppa application, as detailed in the draft Section 106 Agreement. CAA mode share data has used to derive the distribution of trips by mode to proportionately reflect the 15% target of passengers travelling via public transport for the uplift in passengers from 8.6 mppa to 10 mppa (1.4mppa uplift), and the 17.5% target for the uplift from 8.6mppa to 12mppa (3.4mppa uplift). The rationale for this approach is set out in the TAA (**paragraphs 2.3.6-2.3.7 and 3.4.1-3.4.11)**.

5.3.10 Employee trips have been calculated similarly to the original ES (**paragraphs 6.3.21-6.3.23**). Logistics trips have been calculated similarly to the original ES (**paragraphs 6.3.24**).

5.3.11 Chapters 2 and 3 of the TAA detail the Core Case forecast trip generation for 10 mppa and 12 mppa (2030), to determine the net trip generation resulting from the Proposed Development. Consideration is given to the Faster and Slower Growth Cases, as detailed below.

Assessment cases

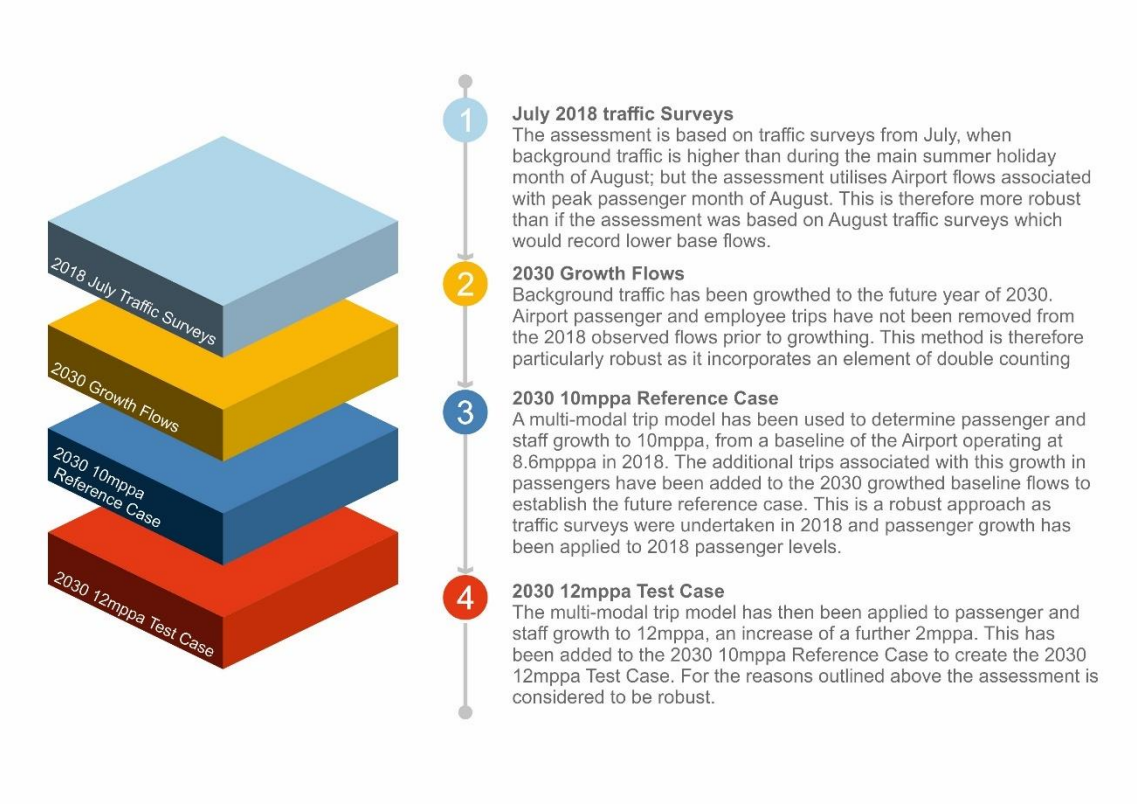
5.3.12 A Core Case has been assessed on the basis of 12 mppa being reached in 2030, which considers the following quantitative assessment:

- 2030 'Without Development' (10 mppa); and
- 2030 'With Development' (12 mppa).

5.3.13 A qualitative assessment has been carried out to account for the potential variance in growth based on a Faster Growth Case of 12 mppa being reached in 2027, and a Slower Growth Case of 12 mppa being reached in 2034.

5.3.14 **Figure 5.2** demonstrates the highway network assessment methodology.

Figure 5.2 Highway network assessment methodology



5.4 Overall baseline

5.4.1 This section summarises current baseline conditions and how they are expected to evolve by 2030 (the year at which 12 mppa is anticipated to be reached in the Core Case), due to projected increases in traffic flows on the local highway network.

Current baseline

Highway network

5.4.2 No changes apply to the existing highway network in the vicinity of Bristol Airport. Refer to **Chapter 6: Traffic and Transport** of the original ES (**paragraph 6.4.2**).

Baseline traffic flows

5.4.3 No changes apply to the baseline traffic flows. Refer to **Chapter 6: Traffic and Transport** of the original ES (**paragraph 6.4.8**).

Pedestrian and cycle network

5.4.4 No changes apply to the existing pedestrian and cycle network. Refer to **Chapter 6: Traffic and Transport** of the original ES (**paragraph 6.4.9**).

Public transport network

5.4.5 No changes apply to the existing public transport network. Refer to **Chapter 6: Traffic and Transport** of the original ES (**paragraph 6.4.19**).

Accident data

5.4.6 No changes apply to the accident data. Refer to **Chapter 6: Traffic and Transport** of the original ES (**paragraph 6.4.30**).

5.4.7 At the time of writing a request has been made to NSC for updated collision data for the previously agreed study area (with NSC and Bristol City Council) but is not yet available, so has not been taken into account. It is not expected that the most recent data will lead to any different conclusions to those reported in the original ES.

Future baseline

Core Case

5.4.8 The same approach as used in the original ES to estimate the baseline for the assessment of the Proposed Development has been applied; the 'Without Development' Core Case i.e. 2030 Reference Case (including the consented growth to 10 mppa) was considered to be the most suitable baseline to be used in this assessment. This approach was agreed for the TA with NSC (albeit using 2026 as the predicted future baseline year) and has been carried forwards using the same approach in the TAA and this ES Addendum.

5.4.9 This future baseline has factored in traffic growth using TEMPro which has accounted for committed development allocated within the NSC adopted Development Plan and overall traffic growth predicted on the surrounding highway network. TEMPro has been used with the National Traffic Model (NTM) database for the North Somerset area to identify growth between 2018 and 2030. The resulting 2030 factors are set out in **Table 5.2**.

Table 5.2 TEMPro NTM adjusted traffic growth (2018 to 2030)

Level	07:00-10:00	10:00-16:00	16:00-19:00	00:00-07:00 19:00-00:00	Average Weekday
North Somerset	1.1830	1.2147	1.1832	1.1770	1.1936

5.4.10 Future baseline traffic flows have been estimated by applying the average weekday growth factor set out above to the 2018 base flows, and these are presented in **Table 5.3** (note that the % HGV composition remains unchanged from the 2018 baseline presented in the **Chapter 6: Traffic and Transport** of the original ES, **Table 6.3**).

Table 5.3 Study Area 2030 future baseline traffic flows

Link	Name	2030 All Traffic 18 hr AAWT - Without Development	2030 HGV 18 hr AAWT – Without Development	% HGV Composition
1	A368 Dinghurst Road	9,550	494	5.2%
2	A38 New Road	18,562	796	4.3%
3	A368 Bath Road	6,525	479	7.3%

Link	Name	2030 All Traffic 18 hr AAWT - Without Development	2030 HGV 18 hr AAWT – Without Development	% HGV Composition
4	A38 (North of Dinghurst Road)	21,647	1,177	5.4%
5	Brockley Lane	1,956	73	3.7%
6	A370 Main Road (North)	16,187	822	5.1%
7	A370 Main Road (South)	20,011	905	4.5%
8	A370 (North of Colliters Way)	42,121	1,533	3.6%
9	A4174 Colliters Way (North)	29,608	1,355	4.6%
10	A38 Bridgwater Road (North)	15,031	749	5.0%
11	A4174 Colliters Way (South)	20,710	1,055	5.1%
12	A38 (North of West Lane)	30,949	1,264	4.1%
13	Barrow Street	5,645	182	3.2%
14	West Lane	7,475	99	1.3%
15	Downside Road	7,773	293	3.8%
16	A38 (South of Silver Zone)	21,848	929	4.3%
17	Barrow Lane	4,179	113	2.7%
18	Hyatt's Wood Road	2,043	34	5.2%

5.4.11 As part of the consented 10 mppa development for Bristol Airport, a number of public transport services were agreed to be provided to support growth in sustainable modes of travel, in order to achieve a passenger public transport mode share target of 15%. These are detailed in the original ES (**paragraph 6.4.34**).

5.4.12 It is noted that, despite not having yet reached 10 mppa, BAL has made significant progress towards these key public transport enhancements. The following measures have been delivered:

- 8 buses an hour to Bristol City Centre;
- 1 bus an hour to Weston-super-Mare;
- 2 buses an hour to Bath;
- 1 bus an hour to Plymouth;
- 1 coach every 2 hours to Cardiff; and
- Public transport fund set up and financially supports the A5 (Yatton and Winscombe) local bus service.

5.4.13 Furthermore, the 'Bristol Flyer' buses have recently been upgraded to double decker models with leather seats, additional luggage space, free wi-fi and USB sockets.

Comparison with the original ES

5.4.14 Future baseline traffic flows estimated as part of this assessment and presented in **Table 5.3** above are typically around 4-5% higher than those in the original ES. This is due to the additional background traffic growth predicted as a result of the delay of the Assessment Year (under the Core Case) from 2026 to 2030. The above factors have not yet been adjusted by the Department for Transport to account for the impact of Covid-19 on travel. This is likely to result in lower traffic growth actually being realised by 2030 than the values assessed in this ESA. The flows used for future assessments are therefore likely to be an over-estimate reflecting a worst case approach.

Faster and Slower Growth Cases

5.4.15 The quantitative assessment of the future baseline presented above has been based on the 2030 Core Case. Consideration has also been given to two sensitivity tests to examine whether the effects of faster (i.e. earlier) or slower (i.e. later) growth to 12 mppa makes any material change to the results reported above. In the Faster Growth Case, the airport could reach a throughput of 12 mppa in 2027 and in the Slower Growth Case, the airport could reach a throughput of 12 mppa in 2034.

5.4.16 It is expected that faster growth to 12 mppa (Faster Growth Case) would reflect, and be the result of, higher general economic and hence background growth than that predicted in the NTEM dataset employed to estimate the TEMPro Growth Factors set out in **Table 5.2** above. The Slower Growth Case would reflect lower background growth. Using the assumptions (i.e. dwelling and employment projections) of the 2030 Core Case, the potential variance in background growth has been estimated, as shown in **Table 5.4**.

Table 5.4 Potential variance in background growth (Faster and Slower Growth Cases)

Level		07:00-10:00	10:00-16:00	16:00-19:00	00:00-07:00 19:00-00:00	Average Weekday
Faster Growth Case (2027)	Comparison with CS	99.3%	98.7%	99.4%	99.6%	99.2%
	TEMPro Growth Factor	1.175	1.199	1.176	1.172	1.184
Slower Growth Case (2034)	Comparison with CS	101.0%	101.7%	101.1%	100.9%	101.3%
	TEMPro Growth Factor	1.195	1.235	1.196	1.188	1.209

5.4.17 Because the number of passengers is projected to reach 12mppa by 2027 in the Faster Growth Case (i.e. an earlier year), this actually means that background traffic levels will be lower than in the Core Case. As can be seen above, a variance between 99.2% and 101.3% on the future baseline average weekday traffic flows presented in **Table 5.4** is predicted in the Faster and Slower Growth Cases, respectively. This is likely to result in little or no noticeable change in the future baseline conditions.

5.5 Consultation

5.5.1 This section is unchanged from **Section 6.5** in **Chapter 6: Traffic and Transport** of the original ES.

5.6 Scope of the assessment

5.6.1 The following section outlines the scope of the assessment which is based on that previously agreed for the TA with NSC. This scope has been used to determine where there is potential for significant effects to occur, utilising guidance outlined in **Section 6.2** of the original ES.

Spatial scope

Core Case

5.6.2 The approach to assessing the spatial scope of the assessment of traffic and transport is unchanged from **Sections 6.2-6.3** of the original ES.

5.6.3 **Table 5.5** shows the changes in traffic flows anticipated as a result of the Proposed Development, with the resulting changes used to inform the spatial scope of the assessment. This compares the 'Without Development' traffic flows at 2030 (though this includes the consented growth to 10 mppa) with the 'With Development' traffic flows for the 2030 Core Case (i.e. including the additional traffic flows associated with the Proposed Development to facilitate 12 mppa).

Table 5.5 Predicted changes in traffic flows due to operation of the Proposed Development

Link	Name	2030 All Traffic 18hr AAWT – Without Development	2030 All Traffic 18 hr AAWT - With Development	2030 HGV 18 hr AAWT - Without Development	2030 HGV 18 hr AAWT - With Development	% Change in All Traffic 18hr AAWT	% Change in HGV 18hr AAWT
1	A368 Dinghurst Road	9,550	9,550	494	494	0.0%	0.0%
2	A38 New Road	18,562	19,572	796	839	5.4%	0.2%
3	A368 Bath Road	6,525	6,525	479	479	0.0%	0.0%
4	A38 (North of Dinghurst Road)	21,647	22,657	1,177	1,232	4.7%	0.3%
5	Brockley Lane	1,956	2,030	73	76	3.8%	0.1%
6	A370 Main Road (North)	16,187	16,187	822	822	0.0%	0.0%
7	A370 Main Road (South)	20,011	20,353	905	920	1.7%	0.1%
8	A370 (North of Colliters Way)	42,121	44,195	1,533	1,608	4.9%	0.2%
9	A4174 Colliters Way (North)	29,608	31,683	1,355	1,450	7.0%	0.3%
10	A38 Bridgwater Road (North)	15,031	16,060	749	800	6.8%	0.3%
11	A4174 Colliters Way (South)	20,710	20,710	1,055	1,055	0.0%	0.0%
12	A38 (North of West Lane)	30,949	34,094	1,264	1,392	10.2%	0.4%
13	Barrow Street	5,645	5,687	182	183	0.7%	0.0%

Link	Name	2030 All Traffic 18hr AAWT – Without Development	2030 All Traffic 18 hr AAWT - With Development	2030 HGV 18 hr AAWT - Without Development	2030 HGV 18 hr AAWT - With Development	% Change in All Traffic 18hr AAWT	% Change in HGV 18hr AAWT
14	West Lane	7,475	8,191	99	108	9.6%	0.1%
15	Downside Road	7,773	8,263	293	312	6.3%	0.2%
16	A38 (South of Silver Zone)	21,848	22,911	929	974	4.9%	0.2%
17	Barrow Lane	4,179	4,179	113	113	0.0%	0.0%
18	Hyatt's Wood Road	2,043	2,117	34	36	3.6%	0.1%

5.6.4 The only link within the Study Area with a change in 18 hr AAWT flows for total vehicles or HGVs which is greater than 10% is the A38 (North of West Lane) (Link 12), which has an increase in all traffic AAWT of 10.2% and an increase in HGVs of 1.3%. However, HGVs still make up a low composition of the traffic on this link (4.1% of all vehicles).

5.6.5 In accordance with IEMA guidance[27], links which experience changes in flows of less than 10% should be scoped out of the assessment as such variance is likely to already occur on a daily basis. However, given that this is a transport infrastructure related Proposed Development, it was considered appropriate to undertake an assessment where there are changes of >5% in all vehicle or HGV 18hr AAWT.

Comparison with the original ES

5.6.6 The above results in the same links considered as part of the original ES being included within the scope of this assessment. These are:

- Link 2 – A38 New Road;
- Link 9 – A4174 Colliters Way (North);
- Link 10 - A38 Bridgwater Road (North);
- Link 12 – A38 (North of West Lane);
- Link 14 - West Lane; and
- Link 15 – Downside Road.

5.6.7 Traffic flows presented in **Table 5.5** above are higher than those estimated in the original ES due to the delay in the Assessment Year from 2026 to 2030, which results in additional background traffic growth. However, links scoped out of the assessment due to changes in flows of less than 5% (links 1, 3, 4, 5, 6, 7, 8, 11, 13, 16, 17 and 18) remain unchanged from the original ES.

Faster and Slower Growth Cases

5.6.8 Under the Faster and Slower Growth Cases, changes in traffic flows (i.e. '% Change in all traffic' in **Table 5.5** above) are expected to remain as per the Core Case. This is because traffic associated with the Proposed Development is irrespective of the Assessment Year and differences are only anticipated in background traffic.

Temporal scope

Core Case

5.6.9 The temporal scope of the assessment is consistent with the period over which the Proposed Development would be carried out and therefore covers the construction and operational periods. It is anticipated that construction will take place between April 2022 and June 2029, with full operation commencing in 2030 when the 12 mppa limit is expected to be reached.

5.6.10 The assessment of environmental effects relating to traffic and transport during operation in 2030 has considered the following scenarios:

- Baseline (2018) – Current conditions;

[27] Institute of Environmental Assessment (1993). Guidance Notes No.1 – Guidelines for the Environmental Assessment of Road Traffic.

- 2030 'Without Development' – this represents the future baseline conditions that would be expected should the Proposed Development not be progressed, under the assumption that the 10 mppa capacity is met; and
- 2030 'With Development' – this represents conditions that would be expected should the Proposed Development be progressed, in line with the Core Case.

Comparison with the original ES

5.6.11 The original ES anticipated that construction of the Proposed Development would take place between April 2019 and June 2026, with full operation commencing later in 2026.

Faster and Slower Growth Cases

5.6.12 As mentioned previously, consideration has been given to two sensitivity tests to examine whether the effects of faster (i.e. earlier) or slower (i.e. later) growth to 12 mppa makes any material change to the results reported above. These would result in compressed (Faster Growth Case) and extended (Slower Growth Case) construction programmes, as well as early (Faster Growth Case) and delayed (Slower Growth Case) commencement of the operation period.

Potential receptors

5.6.13 The same criteria for receptor sensitivity employed for **Chapter 6: Traffic and Transport** of the original ES applies (**paragraph 6.6.11**).

Likely significant effects

5.6.14 The same traffic and transport effects scoped for further assessment in **Chapter 6: Traffic and Transport** of the original ES apply (**paragraph 6.6.13**).

5.7 Environmental measures embedded into the development proposals

5.7.1 A range of environmental measures have been embedded into the Proposed Development as outlined in **Table 6.12** of **Chapter 6: Traffic and Transport** of the original ES. These remain unchanged.

5.8 Assessment methodology

5.8.1 The assessment methodology outlined in **Section 6.8** of **Chapter 6: Traffic and Transport** of the original ES remains unchanged.

5.9 Assessment of construction effects

5.9.1 An assessment of the construction effects was carried out in the original ES using construction traffic movements for each phase of construction provided by QuantumCLS construction consultancy and informed by BAL. These movements were used to derive the total vehicle and HGV AAWT construction traffic flows for the baseline year (2018) and Assessment Year considered as part of the planning application (2026).

5.9.2 The original ES concluded that construction traffic would not cause an increase of more than 5% in total vehicles or HGVs on any of the identified study links along the A38. As noted in **Section 6.3** of the original ES, significant effects are not anticipated where traffic increases of <5% are experienced as such variance can occur on a daily basis. It is therefore considered that there are **no significant effects** in regard to severance, fear and intimidation and accidents and disasters during the construction phase.

5.9.3 The Assessment Year is now 2030 in line with the Core Case, when background traffic on the road network is forecast to be higher. Therefore, the assessment set out in **Table 6.18 Chapter 6: Traffic and Transport** of the original ES reflects a higher impact than is the case with a later period of construction as now proposed since the proportionate impact of construction traffic will be lower in later years. As such, it has not been necessary to update the assessment of construction effects within the ES Addendum.

Faster and Slower Growth Cases

5.9.4 The Faster and Slower Growth Cases anticipate that 12 mppa will be reached in 2027 and 2034, respectively, when background traffic on the road network is forecast to be higher than that estimated in the original ES for the Assessment Year of 2026. As with the Core Case, the assessment set out in the original ES reflects a higher impact than would be the case with a later period of construction (both 2027 and 2034), since the proportionate impact of construction traffic will be lower in later years. It is therefore considered that there are **no significant effects** in regard to severance, fear and intimidation and accidents and disasters during the construction phase under the Faster and Slower Growth Cases.

5.10 Assessment of operational severance effects

Baseline conditions

Current Baseline

5.10.1 No changes apply to the current baseline. Refer to **Section 6.10** in **Chapter 6: Traffic and Transport** of the original ES.

Predicted future baseline

5.10.2 At the time of writing, no known improvements are proposed to the links identified for further assessment in terms of pedestrian and crossing facilities. Therefore, these conditions are expected to remain unchanged by 2030.

5.10.3 There is a general trend of increasing traffic volume over time. It is anticipated that there will be increases in the volume of vehicles travelling on links listed in **paragraph 6.6.5** of the original ES due to predicted increases in housing and jobs provided within the local area. Predicted increases are presented in **Table 5.3** and incorporate additional traffic that is anticipated to occur as a result of Bristol Airport reaching 10 mppa which is expected to occur in 2024.

Predicted effects and their significance

Core Case

5.10.4 A summary of the predicted effects along each assessed link under the 'With Development' 2030 Core Case is presented below, whilst a comparison of the results of this assessment against those estimated as part of **Chapter 6: Traffic and Transport** of the original ES is presented in **Table 5.6**.

Link 2 – A38 New Road

5.10.5 This link is overall classed as **medium** sensitivity due to there being a narrow footpath present which may be used by pedestrians. There is a 5.4% increase in 18hr AAWT traffic flow between the future baseline 'Without Development' scenario and the 'With Development' scenario which equates to a **very low** magnitude change. A 0.2% change in HGVs is expected along this link.

5.10.6 It is therefore anticipated that there will be a **negligible** effect in respect of severance which is **not significant**. This is in line with **Chapter 6: Traffic and Transport** of the original ES.

Link 9 – A4174 Colliters Way (North)

5.10.7 This link is largely surrounded by open space, including agricultural land and is therefore classed as being of **very low** sensitivity. There is a 7% increase in 18hr AAWT traffic flow between the future baseline 'Without Development' scenario and the 'With Development' scenario which equates to a **very low** magnitude change. A 0.3% increase in 18hr HGV AAWT is expected to occur which is a negligible magnitude change.

5.10.8 It is therefore anticipated that there will be a **negligible** effect in respect of severance which is **not significant**. This is in line with **Chapter 6: Traffic and Transport** of the original ES.

Link 10 - A38 Bridgwater Road (North)

5.10.9 Residential properties are located along this link which are classified as **low** sensitivity receptors. There is a 6.8% increase in 18hr AAWT traffic flow between the future baseline 'Without Development' scenario and the 'With Development' scenario which equates to a **very low** magnitude change. A 0.3% change in HGVs are expected along this link.

5.10.10 It is therefore anticipated that there will be a **negligible** effect in respect of severance which is **not significant**. This is in line with **Chapter 6: Traffic and Transport** of the original ES.

Link 12 – A38 (North of West Lane)

5.10.11 There are **low** sensitivity receptors located along this link including a number of residential properties, a bed and breakfast (B&B) (Beechwood) and The Fox and Goose public house. There is a 10.2% increase in 18hr AAWT traffic flow between the future baseline 'Without Development' scenario and the 'With Development' scenario which equates to a **low** magnitude change. A 0.4% increase in 18hr HGV AAWT is expected to occur which is a negligible magnitude change.

5.10.12 It is therefore anticipated that there will be a **negligible** effect in respect of severance which is **not significant**. This is in line with **Chapter 6: Traffic and Transport** of the original ES.

Link 14 – West Lane

5.10.13 There are **low** and **very low** sensitivity receptors located along this link including Felton Village Hall, residential properties which front onto West Lane and The George and Dragon public house. There is a 9.6% increase in 18hr AAWT traffic flow between the future baseline 'Without Development' scenario and the 'With Development' scenario which equates to a **very low** magnitude change. A 0.1% increase in HGVs is expected along this link.

5.10.14 It is therefore anticipated that there will be a **negligible** effect in respect of severance which is **not significant**. This is in line with **Chapter 6: Traffic and Transport** of the original ES.

Link 15 – Downside Road

5.10.15 There are a number of receptors located along this link including residents and Tanda and Stoneleigh B&Bs which are **low** sensitivity receptors. There are also narrow footways which are only provided along one side of the carriageway which is classed as a **medium** sensitivity receptor. There is a 6.3% increase in 18hr AAWT traffic flow between the future baseline 'Without Development' scenario and the 'With Development' scenario which equates to a **very low** magnitude change. A 0.2% increase in HGVs is expected to occur along this link.

5.10.16 It is therefore anticipated that there will be a **negligible** effect in respect of severance which is **not significant**. This is in line with **Chapter 6: Traffic and Transport** of the original ES.

Comparison with the original ES

5.10.17 **Table 5.6** below sets out a comparison between the results of the original ES against those estimated as part of this assessment for the Core Case. This shows that there are no material changes to the assessment of predicted operational severance effects.

Table 5.6 Operational Severance Effects - Comparison against the original ES results

Link	ES Addendum		Original ES	
	% Change in All Traffic 18hr AAWT	% Change in HGV 18hr AAWT	% Change in All Traffic 18hr AAWT	% Change in HGV 18hr AAWT
Link 2 A38 New Road	5.4%	0.2%	5.5%	0.0%
Link 9 A4174 Colliters Way (N)	7.0%	0.3%	5.5%	1.5%
Link 10 A38 Bridgwater Road (N)	6.8%	0.3%	8.8%	0.0%
Link 12 - A38 (North of West Lane)	10.2%	0.4%	9.6%	1.6%
Link 14 – West Lane	9.6%	0.1%	9.1%	0.0%
Link 15 – Downside Road	6.3%	0.2%	5.2%	0.0%

Faster and Slower Growth Cases

5.10.18 The same effects and significance on operational severance estimated as part of the Core Case are predicted under the Faster and Slower Growth Cases. This is due to change in traffic flows between the 2030 'Without Development' and 2030 'With Development' remaining as per the Core Case.

5.11 Assessment of operational pedestrian delay and amenity effects

Baseline conditions

Current baseline

5.11.1 No changes apply to the current baseline conditions. Refer to **Section 6.11** of **Chapter 6: Traffic and Transport** of the original ES.

Predicted future baseline

5.11.2 At the time of writing, there are no known improvements proposed to the links identified for further assessment in terms of pedestrian and cyclist facilities. Therefore, these conditions are expected to remain the same in 2030.

5.11.3 Changes in traffic flows are expected to occur by 2030 for the reasons outlined in **Section 5.10**. The following increases in traffic flows are anticipated in 2030 in the absence of the Proposed Development:

- Link 2 - A38 New Road = 199 vehicles/hr;
- Link 9 – A4174 Colliters Way (North) = 334 vehicles/hr;
- Link 10 - A38 Bridgwater Road (North) = 187 vehicles/hr;
- Link 12 – A38 (North of West Lane) = 399 vehicles/hr;
- Link 14 – West Lane = 98 vehicles/hr; and
- Link 15 – Downside Road = 94 vehicles/hr.

Predicted effects and their significance

Core Case

5.11.4 As noted in **Section 6.8** of the original ES, guidance suggests that a two-way vehicle flow of 1,400/hr equates to a ten second delay on a road crossing with no formal crossing points to factor delay against flow. **Table 5.7** shows expected delays with and without the Proposed Development. This assessment is based on 2030 'Without Development' and 'With Development' AAWT traffic flow adjusted to hourly flows.

Table 5.7 Pedestrian delay

Link	2030 - Without Development pedestrian delay (seconds)	2030 - With Development pedestrian delay (seconds)	Change (seconds)
Link 2 A38 New Road	7	8	1
Link 9 A4174 Colliters Way (N)	12	13	1
Link 10 A38 Bridgwater Road (N)	6	6	0
Link 12 - A38 (North of West Lane)	12	14	2
Link 14 – West Lane	3	3	0
Link 15 – Downside Road	3	3	0

5.11.5 Along Link 12: A38 (North of West Lane), Link 9: A4174 Colliters Way, and Link 2: A38 New Road, an increase in delay of 1-2 seconds would be expected when crossing these roads as a result of the traffic added by the Proposed Development. Pedestrian delay is not expected to increase along any of the other links.

5.11.6 Link 9 forms part of the South Bristol Link (SBL) road and it is anticipated that there will be an increase of 115 vehicles/hr along this link. The increase in pedestrian delay may have a negative effect on pedestrians crossing this route, such as between the Public Right of Way (PRoW) which connect to this link; however, a formal crossing point is available at the Bridgwater Road/ Colliters Way junction.

5.11.7 An increase of 174 vehicles/hr is expected along Link 12 which encompasses part of the A38. This route is not a busy pedestrian route due to its rural location; however, there are nine PRoWs which connect to this link and pedestrians may use Link 12 to move between these PRoWs. It is also a busy road which may deter cyclists from using it as there are other, quieter roads and national cycle routes that can be used to travel around the local area (refer to **Figure 6.3** of the original TA).

5.11.8 The Avon Cycleway runs along West Lane and Downside Road, though the increase in hourly vehicle flows along these carriageways are anticipated to be very small (40 and 27 respectively). This increase may decrease the pleasantness of the journey experienced by cyclists along this route; however, this is not expected to deter them from using the West Lane and Downside Road parts of the Avon Cycleway.

5.11.9 The proposed improvements may have a beneficial effect on the amenity to pedestrians and cyclists through the provision of shared footway/cycleways along parts of the A38 and Downside Road and signalisation of the A38/West Lane junction which would allow for more controlled entry onto the A38 for cyclists.

5.11.10 New Road and Bridgwater Road (North) do not form part of any National Cycle Route (NCR); however, cyclists may still use these routes. Footpaths and crossing facilities are provided along the length of these routes which can be used by pedestrians to access nearby areas. However, these footpaths are sometimes in close proximity to the carriageway. Increases in hourly vehicle flows along New Road and Bridgwater Road (North) are expected to be small (56 and 57, respectively).

5.11.11 It is therefore considered that the magnitude of change in respect of pedestrian delay and amenity experienced along these links is **low**. As there are **medium** and **low** sensitive receptors located on these links, effects are anticipated to be **minor** at worst (where receptors are of medium sensitivity) and **not significant**.

Comparison against the original ES

5.11.12 Similar changes in operational pedestrian delay were estimated as part of the original ES. **Table 5.8** below sets out a comparison between the results of the original ES against those estimated as part of this assessment for the Core Case showing differences of no more than 1 second.

Table 5.8 Operational Pedestrian Delay - Comparison against original ES results

Link	ES Addendum			Original ES		
	2030 - Without Development pedestrian delay (seconds)	2030 - With Development pedestrian delay (seconds)	Change (seconds)	2026 - Without Development pedestrian delay (seconds)	2026 - With Development pedestrian delay (seconds)	Change (seconds)
Link 2 A38 New Road	7	8	1	7	7	0
Link 9 A4174 Colliters Way (N)	12	13	1	11	12	1

Link	ES Addendum			Original ES		
	2030 - Without Development pedestrian delay (seconds)	2030 - With Development pedestrian delay (seconds)	Change (seconds)	2026 - Without Development pedestrian delay (seconds)	2026 - With Development pedestrian delay (seconds)	Change (seconds)
Link 10 A38 Bridgwater Road (N)	6	6	0	6	6	0
Link 12 - A38 (North of West Lane)	12	14	2	12	13	1
Link 14 – West Lane	3	3	0	3	3	0
Link 15 – Downside Road	3	3	0	3	3	0

Faster and Slower Growth Cases

5.11.13 The same effects and significance on operational pedestrian delay estimated as part of the Core Case are predicted under the Faster and Slower Growth Cases. This is due to the change in traffic flows between the 2030 'Without Development' and 2030 'With Development' remaining as per the Core Case, as outlined in **paragraph 6.6.7.**

5.12 Assessment of operational fear and intimidation

Baseline conditions

Current baseline

5.12.1 No changes apply to the current baseline. Refer to **Section 6.12** and **Table 6.20** of **Chapter 6: Traffic and Transport** of the original ES.

Predicted future baseline

5.12.2 At the time of writing, no known improvements to the assessed links in terms of pedestrian and cyclist facilities are committed, nor are any changes to speed limits anticipated. As such, these conditions are assumed to remain the same in 2030.

5.12.3 Changes in traffic flows are expected to occur by 2030, for the reasons outlined in **Section 5.10**. These flows are presented in **Table 5.9**, which shows that there is no change in the hazard of fear and intimidation experienced along links 9, 10, 14 and 15. It is anticipated that there may be a change from a 'low' degree of hazard to a 'medium' degree of hazard on Link 2, which is associated with changes in total vehicle traffic flows. There may also be a change from a 'low' degree of hazard to a 'medium' degree of hazard associated with HGV flows; however, total vehicle flows are classified as a 'high' degree of hazard in 2018 and 2030.

Table 5.9 2030 (Without Development) future baseline fear and intimidation hazard

Link	2030 (Without Development) All Traffic 18hr AAWT (vehicles/hour)	Fear and Intimidation Hazard	2030 (Without Development) HGV 18hr AAWT (total)	Fear and Intimidation Hazard
Link 2 - A38 New Road	1,031	Medium	796	Low
Link 9 - A4174 Colliters Way (North)	1,645	High	1,355	Medium
Link 10 - A38 Bridgwater Road (North)	835	Medium	749	Low
Link 12 - A38 (North of West Lane)	1,719	High	1,264	Medium
Link 14 – West Lane	415	Low	99	Very low
Link 15 – Downside Road	432	Low	293	Very low

Predicted effects and their significance

Core Case

5.12.4 Modelled traffic flows for the 2030 'With Development' Core Case and the associated fear and intimidation hazard are presented in **Table 5.10**.

Table 5.10 2030 (with development) fear and intimidation hazard

Link	2030 (With Development) All Traffic 18hr AAWT (vehicles/hour)	Fear and Intimidation Hazard	2030 (With Development) HGV 18hr AAWT (total)	Fear and Intimidation Hazard
Link 2 - A38 New Road	1,087	Medium	839	Low
Link 9 - A4174 Colliters Way (North)	1,760	High	1,450	Medium
Link 10 - A38 Bridgwater Road (North)	892	Medium	800	Low
Link 12 - A38 (North of West Lane)	1,794	High	1,392	Medium
Link 14 – West Lane	455	Low	108	Very low
Link 15 – Downside Road	459	Low	312	Very low

5.12.5 Fear and intimidation hazards associated with the above links will not change as a result of the Proposed Development. Therefore, the magnitude of change on these links is considered to be **very low**. Receptor sensitivity varies along these links from **very low** to **medium**. It is anticipated that effects will be **negligible** and therefore **not significant**.

Comparison against the original ES

5.12.6 The same magnitude of fear and intimidation hazard was estimated as part of the original ES. For reference, **Table 5.11** below shows a comparison against the results obtained in the original ES.

Table 5.11 Operational Fear and Intimidation Hazard – Comparison against ES

Link	ES Addendum		Original ES	
	2030 (With Development) All Traffic 18hr AAWT (vehicles/hour)	2030 (With Development) HGV 18hr AAWT (total)	2030 (With Development) All Traffic 18hr AAWT (vehicles/hour)	2030 (With Development) HGV 18hr AAWT (total)
Link 2 - A38 New Road	1,087	839	996	768
Link 9 - A4174 Colliters Way (North)	1,760	1,450	1,570	1,293
Link 10 - A38 Bridgwater Road (North)	892	800	801	718
Link 12 - A38 (North of West Lane)	1,794	1,392	1,643	1,210
Link 14 – West Lane	455	108	393	94
Link 15 – Downside Road	459	312	403	273

Faster and Slower Growth Cases

5.12.7 No changes to the predicted effects and their significance on operational fear and intimidation are anticipated in the Faster Growth Case, as traffic levels (including development traffic) would be lower than those presented in **Table 5.10**. In the Slower Growth Case, traffic flows are only expected to increase by around 1.3% (**Table 5.4**), so no changes in magnitude are anticipated.

5.13 Assessment of operational driver delay effects

Core Case

5.13.1 The TAA (**Appendix 5A**) has assessed the impact that the Proposed Development may have on junction capacity at a number of junctions within the Study Area. Junctions where a 5% or greater increase in vehicles in any of the three peak hours, AM (08:00-09:00), Inter Peak (13:00-14:00) and PM (17:00-18:00), may be expected were identified for further capacity modelling. These junctions are the same junctions assessed as part of the original ES, namely:

- Junction 1 A38 / Bristol Airport Northern Roundabout;
- Junction 2 A38 / Bristol Airport Southern Roundabout;
- Junction 3 Downside Road / Bristol Airport Service Access;
- Junction 4a A38 / Downside Road;
- Junction 4b A38 / West Lane;
- Junction 5 A38 / Barrow Street;
- Junction 6 A38 / Barrow Lane; and
- Junction 7 A38 / A4174 SBL.

Current baseline

5.13.2 No changes apply to the current baseline. Refer to **Section 6.13** and **Table 6.23** of **Chapter 6: Traffic and Transport** of the original ES.

Predicted future baseline

5.13.3 At the time of writing, there are no known plans to improve any of the junctions that have been capacity tested by 2030, with the exception of improvements at junctions near the airport access along the A38 i.e. A38/ Northern Roundabout and A38/ Downside Road and West Lane junctions as part of the proposed development that do not for part of the future baseline.

5.13.4 Forecast delays anticipated in 2030 in the absence of the Proposed Development are outlined in **Table 5.12**.

Table 5.12 2030 (Without Development) driver delay

Junction Number	Junction Name	Arm	2030 (Without Development) delay (seconds)		
			AM	Inter	PM
1	A38 / Northern Roundabout	A38 (North)	3.33	4.54	8.58
		Cul-de-Sac	5.53	8.05	17.04
		A38 (South)	6.41	4.99	9.9
		Bristol Airport	3.51	4.59	5.48
2	A38 / Southern Roundabout	A38 (North)	2.9	3.3	3.78
		A38 (South)	3.5	2.41	2.8
		Bristol Airport	5.94	4.45	5.19

Junction Number	Junction Name	Arm	2030 (Without Development) delay (seconds)		
3	Downside Way / Bristol Airport	Bristol Airport Left Turn	6.76	6.27	7.09
		Bristol Airport Right Turn	11.06	9.32	10.41
		Downside Road (West)	5.04	5.12	5.13
4a	A38/Downside Road	A38 (S)	34	19.4	223.1
		Downside Road	133.7	150.6	587.6
		A38 (N)	48	63.3	523.3
4b	A38/West Lane	West Lane (Left Turn)	227.87	1835.05	3515.4
		West Lane (Right Turn)	461.03	2262.67	4296.68
		A38 (S)	16.79	19.35	57.88
5	A38 / Barrow Street	A38 Bridgewater Road (W) – Left Ahead	27.9	22.7	30.2
		A38 Bridgewater Road (W) – Ahead	17.7	13.2	21.4
		B3130 Barrow Street	60.6	59.3	45.2
		A38 Bridgewater Road (E) - Ahead	9.9	7.9	19.3
		A38 Bridgewater Road (E) – Ahead & Right	39.1	28	30.5
6	A38/Barrow Lane	Barrow Lane	729.15	370.79	3092.49
		A38(S) Right Turn	9.53	8.11	14.59

Junction Number	Junction Name	Arm	2030 (Without Development) delay (seconds)		
7	SBL / A38	SBL (North) – Ahead & Left	23.8	23.4	31.4
		SBL (North) – Ahead	21.6	23.3	30.3
		A38 (North) – Ahead + Left	34.8	28.6	36.5
		A38 (North) – Ahead	34.6	27.4	32.1
		SBL (South) – Left	22.3	27.5	29.4
		SBL (South) – Ahead	23	23.8	25.7
		A38 (South) – Left	14.5	11.5	10.9
		A38 (South) – Ahead	11.5	7.6	9.2

5.13.5 Delays are expected to increase at the majority of junctions due to future traffic growth associated with surrounding development, including additional trips associated with Bristol Airport reaching 10 mppa.

5.13.6 An increase in delays of 100% or greater is expected to occur at one or more peak periods at Junction 4a, 4b, 5 and 6. The greatest increases are anticipated at Junction 6, particularly on Barrow Lane (from 22s to 3,092s) and at Junction 4b, particularly on the West Lane Right Turn (from 287s to 4297s) and West Lane Left Turn (from 57s to 3,515s) arms. This reflects the constrained nature of these junctions and their predicted peak hour condition being over-capacity in the 2030 'Without Development' scenario.

5.13.7 Although increases in delay greater than 100% are expected at Junction 5 as a result of future traffic growth, none of these increases equate to more than 40 seconds. The greatest delay change at this junction is expected on the B3130 Barrow Street arm in the AM period (increase in delay from 22s to 61s).

Predicted effects and their significance

5.13.8 As part of the Proposed Development, upgrades will be made to Junctions 1, 4a and 4b and there will be widening of the A38 between Junction 4a and 4b, as outlined in **Section 6.7** of the original ES.

5.13.9 **Table 5.13** presents delays that would be expected at junctions in their existing state (status noted as 'existing') and once they have been upgraded as part of the Proposed Development (status noted as 'proposed'). Values have been noted as 'N/A' where junctions have been re-designed such that new arms or lanes have been added and a direct comparison of driver delay times is not possible.

Table 5.13 2030 (With Development) driver delay and change in delay (seconds) from 2030 (Without Development) scenario (in Table 5.22)

Status	Junction Number	Junction Name	Arm	2030 (With Development) delay (seconds)			Change in delay (seconds) from 2030 Without Development		
				AM	Inter	PM	AM	Inter	PM
Existing	1	A38 / Northern Roundabout	A38 (North)	3.54	5.82	23.61	0.21	1.28	15.03
			Cul-de-Sac	5.90	10.77	91.62	0.37	2.72	74.58
			A38 (South)	7.10	6.10	24.01	0.69	1.11	14.11
			Bristol Airport	3.72	5.99	7.82	0.21	1.4	2.34
Proposed	1	A38 / Northern Roundabout	A38 (North)	3.54	5.82	23.60	0.21	1.28	15.02
			Cul-de-Sac	5.90	10.77	91.54	0.37	2.72	74.5
			A38 (South)	7.26	6.20	25.26	0.85	1.21	15.36
			Bristol Airport	3.99	6.91	9.31	0.48	2.32	3.83
Existing	2	A38 / Southern Roundabout	A38 (North)	2.92	3.43	3.96	0.02	0.13	0.18
			A38 (South)	3.54	2.46	2.92	0.04	0.05	0.12
			Bristol Airport	6.01	4.57	5.42	0.07	0.12	0.23
			Bristol Airport Left Turn	6.79	6.3	7.13	0.03	0.03	0.04

Status	Junction Number	Junction Name	Arm	2030 (With Development) delay (seconds)			Change in delay (seconds) from 2030 Without Development		
				AM	Inter	PM	AM	Inter	PM
Existing	3	Downside Way / Bristol Airport	Bristol Airport Right Turn	11.15	9.4	10.63	0.09	0.08	0.22
			Downside Road (West)	5.04	5.1	5.03	0	-0.02	-0.1
Existing	4a	A38/Downside Road	A38 (S)	49.3	35.3	377.4	15.3	15.9	154.3
			Downside Road	144.4	264.9	741.2	10.7	114.3	153.6
			A38 (N)	81.3	184.5	703.7	33.3	121.2	180.4
Proposed	4a	A38/ Downside Road	A38 (S) - Left & Ahead	8.4	7.4	5.9	-15.6	-4.0	-211.1
			A38 (S) - Ahead	10.0	8.0	6.1			
			Downside Road - Left	32.2	35.3	33.1	-101.5	-115.3	-554.5
			A38 (N) – Ahead	5.5	3.2	2.6	-36.7	-56.6	-517.9
			A38 (N) – Ahead & Left	5.8	3.5	2.8			
Existing	4b	A38/West Lane	West Lane (Left Turn)	707.10	1480.23	Inf	479.23	-354.82	Inf
			West Lane (Right Turn)	1584.80	1595.70	Inf	1123.77	-666.97	Inf
			A38 (S)	18.40	26.03	1136.51	2.41	11.37	1094.75

Status	Junction Number	Junction Name	Arm	2030 (With Development) delay (seconds)			Change in delay (seconds) from 2030 Without Development		
				AM	Inter	PM	AM	Inter	PM
Proposed	4b	A38/West Lane	A38 (N) – Ahead	14.6	18.1	19.2	N/A	N/A	N/A
			A38 (N) – Left	28.0	29.6	44.5	N/A	N/A	N/A
			West Lane – Left	1.8	1.9	2.1	-660.9	-4068.12	-7767.58
			A38 (S) – Ahead	6.0	6.0	4.8	-8.99	-11.45	-50.98
Existing	5	A38 / Barrow Street	A38 Bridgewater Road (W) – Left Ahead	29.7	28.7	34.8	1.8	6	4.6
			A38 Bridgewater Road (W) – Ahead	17.9	13.4	21.1	0.2	0.2	-0.3
			B3130 Barrow Street	61.1	60.0	54.9	0.5	0.7	9.7
			A38 Bridgewater Road (E) - Ahead	10.2	8.5	23.0	0.3	0.6	3.7
			A38 Bridgewater Road (E) – Ahead & Right	38.9	27.8	30.5	-0.2	-0.2	0
Existing	6	A38 / Barrow Lane	Barrow Lane	1438.34	826.76	2498.60	709.19	455.97	-593.89
			A38(S) Right Turn	9.83	8.75	18.43	0.3	0.64	3.84
Existing	7	SBL / A38	SBL (N) – Ahead & Left	24.1	24.3	30.8	0.3	0.9	-0.6
			SBL (N) – Ahead	21.8	24.2	30.4	0.2	0.9	0.1

Status	Junction Number	Junction Name	Arm	2030 (With Development) delay (seconds)			Change in delay (seconds) from 2030 Without Development		
				AM	Inter	PM	AM	Inter	PM
			A38 (N) – Ahead + Left	35.7	29.7	40.9	0.9	1.1	4.4
			A38 (N) – Ahead	34.6	27.4	31.4	0	0	-0.7
			SBL (S) – Left	22.3	27.5	29.5	0	0	0.1
			SBL (S) – Ahead	23.2	24.1	26.7	0.2	0.3	1
			A38 (S) – Left	15.0	13.5	12.2	0.5	2	1.3
			A38 (S) – Ahead	11.6	7.5	9.6	0.1	-0.1	0.4

5.13.10 Only Junctions 1, 4a, 4b and 6 will experience changes in driver delay which are greater than a magnitude of **very low**. All other junctions will experience an increase or decrease in delay of less than 20 seconds at peak times, which equates to a very low magnitude change. Most receptors in proximity to these junctions are of **very low** or **low** sensitivity (residential and open space) and so effects are largely negligible. Only Junction 5 will experience a **minor adverse** effect as there is a high sensitivity receptor (roads used by pedestrians with no footways) present on Barrow Street (Link 13) near this junction. This effect is considered to be **not significant**.

5.13.11 Junction 1 will experience a **high** magnitude delay change in the PM peak (75s), but only on the 'Cul-de-Sac' arm of the junction. This cul-de-sac serves one commercial property and is observed to be used by taxis as an unauthorised layover area and by some passengers to drop-off. In consequence, flows into this arm are expected to reduce with the proposed measures included in the draft Section 106 Agreement. There are no sensitive receptors at this access and effects are considered to be negligible.

5.13.12 As the layout of Junctions 4a and 4b will be altered as a result of the Proposed Development, a direct comparison cannot be made between delays experienced on each of the arms of these junctions. The maximum delay experienced at Junction 4b in the absence of the Proposed Development is 72 minutes on the West Lane Right Turn arm. In comparison, the longest delay predicted at this junction once altered as part of the Proposed Development is 45 seconds on the West Lane Left arm. This equates to a **very high** magnitude beneficial change at a junction which is in proximity to **very low** and **low** sensitivity receptors including Felton Village Hall. The significance effect at these junctions is therefore either beneficial **moderate** or **major** (depending on receptor sensitivity) and it is considered that the Proposed Development will result in a **significant beneficial effect** in respect of reduced driver delay.

5.13.13 The longest delay anticipated in absence of the Proposed Development on Junction 4a is approximately 10 minutes, on the Downside Road arm (Table 5.12). In comparison, the longest delay expected at this junction once it has been upgraded as part of the Proposed Development is 35 seconds on the Downside Road Left arm. At greater than 90 seconds, the magnitude of change is **very high**. There are **low** sensitivity receptors present in close proximity to this junction, including residential properties, resulting in major effect significance. Therefore, with respect to reduced driver delay, the Proposed Development will result in a **significant beneficial effect**.

5.13.14 At Junction 6, it is anticipated that there will be a maximum increase in delay of 12 minutes which would occur on the Barrow Lane arm during the AM peak hour only. Increases in delay during all other hours of the day would be lower. This would equate to a **high** magnitude adverse change. There is a **low** sensitivity receptor in close proximity to this junction in the form of a residential property. However, the majority of the surrounding area is comprised of agricultural land which is of **very low** sensitivity. This could result in a **minor** to **moderate adverse** effect; however, given that the area surrounding the junction is largely open space, it is considered that this effect would be **not significant**.

Comparison with the original ES

5.13.15 **Table 5.14** shows a comparison between the change in delay estimated as part of this assessment and the original ES. This shows that there are no material changes in operational driver delay as a result of the updated assessment, with the exception of the Barrow Lane arm at Junction 6. However, it was noted in site observations that traffic is able to emerge from the junction due to gaps in traffic partly caused by the 'platooning' effect of traffic from the Barrow Street signalised junction located north of the junction. Some traffic using this route is more likely to reassign to an alternative route if such long queues actually arose, potentially the improved West Lane junction. In reality therefore, a smaller change in delay is expected at this arm as a result of the gaps in traffic not accounted for by the model.

Table 5.14 Change in delay (seconds) – Comparison against original ES

Status	Junction Number	Junction Name	Arm	ES Addendum			Original ES		
				AM	Inter	PM	AM	Inter	PM
Existing	1	A38 / Northern Roundabout	A38 (North)	0.21	1.28	15.03	0.42	1.69	1.63
			Cul-de-Sac	0.37	2.72	74.58	1.09	6.79	7.35
			A38 (South)	0.69	1.11	14.11	2.13	2.04	3.54
			Bristol Airport	0.21	1.4	2.34	0.21	2.44	0.98
Proposed	1	A38 / Northern Roundabout	A38 (North)	0.21	1.28	15.02	0.06	0.08	1.88
			Cul-de-Sac	0.37	2.72	74.5	-0.01	0.00	7.35
			A38 (South)	0.85	1.21	15.36	0.00	0.12	3.58
			Bristol Airport	0.48	2.32	3.83	0.69	-0.91	-0.78
Existing	2	A38 / Southern Roundabout	A38 (North)	0.02	0.13	0.18	0.06	0.26	0.15
			A38 (South)	0.04	0.05	0.12	0.14	0.15	0.12
			Bristol Airport	0.07	0.12	0.23	0.17	0.47	0.34
Existing	3		Bristol Airport Left Turn	0.03	0.03	0.04	0.01	0.05	0.09

Status	Junction Number	Junction Name	Arm	ES Addendum			Original ES		
				AM	Inter	PM	AM	Inter	PM
		Downside Way / Bristol Airport	Bristol Airport Right Turn	0.09	0.08	0.22	0.09	0.15	0.21
			Downside Road (West)	0	-0.02	-0.1	-0.02	-0.03	0.01
Existing	4a	A38/Downside Road	A38 (S)	15.3	15.9	154.3	60.90	154.60	96.50
			Downside Road	10.7	114.3	153.6	59.10	156.40	141.30
			A38 (N)	33.3	121.2	180.4	6.60	61.20	108.00
Proposed	4a	A38// Downside Road	A38 (S)	-15.6	-4.0	-211.1	N/A	N/A	N/A
			Downside Road - Left	-101.5	-115.3	-554.5	N/A	N/A	N/A
			A38 (N) – Ahead	-36.7	-56.6	-517.9	N/A	N/A	N/A
Existing	4b	A38/West Lane	West Lane (Left Turn)	479.23	-354.82	Inf	79.02	122.78	410.63
			West Lane (Right Turn)	1123.77	-666.97	Inf	4175.08	76.38	1461.06
			A38 (S)	2.41	11.37	1094.75	2.67	14.21	52.46
Proposed	4b	A38/West Lane	A38 (N) – Ahead	N/A	N/A	N/A	N/A	N/A	N/A
			A38 (N) – Left	N/A	N/A	N/A	N/A	N/A	N/A

Status	Junction Number	Junction Name	Arm	ES Addendum			Original ES		
				AM	Inter	PM	AM	Inter	PM
			West Lane – Left	-660.9	-4068.12	-7767.58	N/A	N/A	N/A
			A38 (S) – Ahead	-8.99	-11.45	-50.98	N/A	N/A	N/A
Existing	5	A38 / Barrow Street	A38 Bridgewater Road (W) – Left Ahead	1.8	6	4.6	6.00	11.60	11.20
			A38 Bridgewater Road (W) – Ahead	0.2	0.2	-0.3			
			B3130 Barrow Street	0.5	0.7	9.7	-1.40	-3.30	-2.30
			A38 Bridgewater Road (E) - Ahead	0.3	0.6	3.7	-14.10	3.20	4.60
			A38 Bridgewater Road (E) – Ahead & Right	-0.2	-0.2	0			
Existing	6	A38 / Barrow Lane	Barrow Lane	709.19	455.97	-593.89	50.00	74.10	45.60
			A38(S) Right Turn	0.3	0.64	3.84	0.1	0.6	0.3
Existing	7	SBL / A38	SBL (N) – Ahead & Left	0.3	0.9	-0.6	1.60	1.00	1.40
			SBL (N) – Ahead	0.2	0.9	0.1	1.60	1.10	1.30
			A38 (N) – Ahead + Left	0.9	1.1	4.4	2.20	2.80	3.00
			A38 (N) – Ahead	0	0	-0.7	0.00	0.00	0.00
			SBL (S) – Left	0	0	0.1	0.00	0.00	0.00

Status	Junction Number	Junction Name	Arm	ES Addendum			Original ES		
				AM	Inter	PM	AM	Inter	PM
			SBL (S) – Ahead	0.2	0.3	1	0.00	0.40	0.20
			A38 (S) – Left	0.5	2	1.3	-0.60	2.90	0.60
			A38 (S) – Ahead	0.1	-0.1	0.4	-0.50	-0.10	0.30

Faster and Slower Growth Cases

5.13.16 A smaller change in delay than that estimated as part of the Core Case is predicted in the Faster Growth Case, as a result of the slightly reduced increase in background traffic anticipated up to 2027. However, a marginal increase in delay is expected in comparison with the original ES, which was based on the 2026 Assessment Year. It is expected that the significance of effects at all junctions under the Faster Growth Case would remain as per the Core Case

5.13.17 A potentially greater change in delay than that estimated as part of the Core Case is predicted in a Slower Growth Case, as a result of the additional c1.1% background traffic growth likely to occur between 2030 and 2034. This is likely to be insignificant at all junctions where some capacity is available as reported in **Section 5.2** of the TAA (J2, J3, J4, J7) (**Appendix 5A**). Where junctions are predicted to be approaching capacity (J1, J5), the increase in background traffic flows of 1.1% is unlikely to have any significant noticeable effect, with changes in delay that would be considered very low in magnitude. The only junction that is predicted to be over capacity in the With and Without Development scenarios (J6) would experience some further increase in delay should traffic continue to use that route. No airport traffic is predicted to use this road and the receptor sensitivity is low.

5.13.18 Overall, the conclusions and effects are unchanged from the original ES under both the Faster and Slower Growth Cases.

Conclusions of significance evaluation

5.13.19 A summary of the results of the assessment of the traffic and transport effects is provided in **Table 5.15**.

Table 5.15 Summary of significance of effects

Receptor and summary of predicted effects		Sensitivity/ importance/ value of receptor[1]	Magnitude of change[2]	Significance[3]	Summary rationale
Construction					
Severance **Pedestrian and Cyclist Delay and Amenity** **Fear and Intimidation** **Accidents and Road Safety**	Links 1 - 18	Very low - High	Negligible	Negligible (not significant)	It is not anticipated that links will experience more than a 5% change in total vehicle AAWT or HGV AAWT and therefore no significant effects are anticipated. A CEMP has been submitted as part of the application which outlines measures to reduce potential adverse impacts to the local highway network during the construction phase.
Driver Delay	Links 12, 14 and 15	N/A	N/A	Not significant	There may be a temporary adverse effect associated with driver delay along the A38 and at the northern and southern Bristol Airport roundabouts whilst upgrades are being undertaken however it is not anticipated that this would be significant due to

Receptor and summary of predicted effects		Sensitivity/ importance/ value of receptor[1]	Magnitude of change[2]	Significance[3]	Summary rationale
					the localised and temporary nature of the works.
			Operation		
Severance	Link 2 A38 New Road	Medium	Very low	Negligible (not significant)	The majority of the area through which these links pass is open space and agricultural land. Link 12, 14 and 15 also pass through the villages of Potters Hill, Felton and Lulsgate Bottom, respectively, where residential receptors are located. Increases in traffic expected along these as a result of the Proposed Development may result in an increase in the severance experienced within these villages as there are a lack of formal crossing points. However, these increases in traffic are expected to be relatively minor and therefore effects are likely to be negligible.
	Link 9 A4174 Colliters Way (North)	Very low	Very low	Negligible (not significant)	
	Link 10 A38 Bridgwater Road (North)	Low	Very low	Negligible (not significant)	
	Link 12 A38 (North of West Lane)	Low	Low	Negligible (not significant)	
	Link 14 West Lane	Low	Very low	Negligible (not significant)	
	Link 15 Downside Road	Medium	Very low	Negligible (not significant)	
Pedestrian and Cyclist Delay and Amenity	Link 2 A38 New Road	Medium	Low	Minor adverse (not significant)	The lack of formal pedestrian and cycle facilities, such as footpaths, controlled crossing points and cycle lanes reflects the rural nature of the local area surrounding Bristol Airport. There are a number of footpaths which are present along these links (at least in part) and the NCR 410 runs along West Lane and Downside Road. It is anticipated that the increases in traffic flows will result in a very low change to pedestrian and cyclist delay and amenity, however this will mainly be related to the pleasantness of the journey, particularly by cyclists using the NCR 410 and will not be significant.
	Link 9 A4174 Colliters Way (North)	Very low	Low	Negligible (not significant)	
	Link 10 A38 Bridgwater Road (North)	Low	Low	Negligible (not significant)	
	Link 12 A38 (North of West Lane)	Low	Low	Negligible (not significant)	
	Link 14 West Lane	Low	Low	Negligible (not significant)	
	Link 15 Downside Road	Medium	Low	Minor adverse (not significant)	
Fear and Intimidation	Link 2 A38 New Road	Medium	No change	Negligible (not significant)	The Proposed Development is not expected to increase the level of fear and hazard experienced on five of the six links. On these links the same level of hazard is expected to occur in 2026 with or without the development. Only Link 12 is expected to see an increase in fear and intimidation hazard experienced which may change from 'high' to 'very high'. This is
	Link 9 A4174 Colliters Way (North)	Very low	No change	Negligible (not significant)	
	Link 10 A38 Bridgwater Road (North)	Low	No change	Negligible (not significant)	
	Link 12 A38 (North of West Lane)	Low	No change	Minor adverse (not significant)	

Receptor and summary of predicted effects		Sensitivity/ importance/ value of receptor[1]	Magnitude of change[2]	Significance[3]	Summary rationale
	Link 14 West Lane	Low	No change	Negligible (not significant)	mainly due to flows being within the upper end of the 'high' hazard classification in absence of the Proposed Development, and the additional flows related to the Proposed Development resulting in the total vehicle flows falling within the 'very high' hazard by one vehicle an hour.
	Link 15 Downside Road	Medium	No change	Negligible (not significant)	
Driver Delay	Junction 1 A38 / Bristol Airport Northern Roundabout	Very Low and Low	High	Negligible (not significant)	Highway improvements and junction upgrades proposed as part of the Proposed Development will help reduce driver delay times at Junctions 4a and 4b which is likely to have significant beneficial effects. Increases in vehicle movements associated with the Proposed Development may cause a change in driver delay time of less than 20 seconds at junctions 2, 3, 5 and 7 and therefore no significant effects are anticipated at these locations. There will be increases in delay of up to 75 seconds during the PM peak hour at Junction 1 and delays of up to 12 minutes at Junction 6 , however given the nature of the surrounding area and receptors it is not anticipated that this would result in significant effects.
	Junction 2 A38 / Bristol Airport Southern Roundabout	Low	Very low	Negligible (not significant)	
	Junction 3 Downside Road / Bristol Airport Service Access	Low	Very low	Negligible (not significant)	
	Junction 4a A38 / Downside Road	Low	Very high	Moderate/major beneficial (significant beneficial)	
	Junction 4b A38 / West Lane	Low	Very high	Major beneficial (significant beneficial)	
	Junction 5 A38/Barrow Street	High	Very low	Negligible (not significant)	
	Junction 6 A38 / Barrow Lane	Very Low and Low	Very high	Moderate adverse (not significant)	
	Junction 7 A38 / A4174 South Bristol Link	Low	Very low	Negligible (not significant)	
Accidents and Road Safety	N/A	N/A	N/A	N/A	No specific concerns were identified with regards to the geometric design / road layout of the local highway network. It is not anticipated that the Proposed Development will have a significant effect on accidents and road safety, however, there is potential for there to be a minor beneficial effect at the A38/Downside road/West Lane junction where a cluster of accidents was identified. This is due to improvements to be provided at this location as part

Receptor and summary of predicted effects	Sensitivity/ importance/ value of receptor[1]	Magnitude of change[2]	Significance[3]	Summary rationale
				of the proposal e.g. signalisation of the A38/ West Lane junction.

5.13.20 These predicted effects are based on the quantitative assessment for the 2030 Core Case, but the conclusions are considered to be robust against the 2027 Faster Growth Case and 2034 Slower Growth Case.

5.14 Consideration of additional mitigation

5.14.1 The assessment set out above has concluded that it will not be necessary to implement further mitigation, over and above the embedded mitigation measures outlined in **Section 6.7** of **Chapter 6: Traffic and Transport** of the original ES. However, a Draft Workplace Travel Plan (**Appendix 6B** of the original ES) has been prepared and submitted as part of the application and the implementation of an Airport Surface Access Strategy (ASAS) will be secured by obligation, as well as other commitments that are included in the draft Section 106 Agreement for the Proposed Development. These documents and commitments outline Bristol Airport's strategy to reduce car trips and encourage the use of more sustainable modes of transport by employees, passengers and visitors, as set out in **Section 6** of the TAA (**Appendix 5A**).

5.15 Conclusions of significance evaluation

5.15.1 The assessment of Traffic and Transport effects carried out for this ES Addendum does not alter the conclusions reported in the original ES.

5.15.2 No significant effects are anticipated to occur during the construction phase of the Proposed Development due to the traffic flows associated with this phase and the implementation of mitigation measures through the CEMP to help reduce potential adverse effects on the local highway network.

5.15.3 Changes in traffic flows experienced on the highway network as a result of the Proposed Development are expected to be small, with less than 10% increases in the number of total vehicles at all junctions except the A38 (North of West Lane), where an increase of 10.2% of all traffic is expected as a result of the 2 mppa increase. Moreover, an increase of less than 2% in HGVs is anticipated at all junctions. This has not affected the assessment criteria.

5.15.4 The areas likely to experience the highest increase in traffic flows are located just to the north and east of Bristol Airport, along the A38 and West Lane. These routes have a number of sensitive receptors located along them including residential properties in the small villages of Potters Hill, Lulsgate Bottom and Felton. Although increases in traffic flows will be experienced along these links, effects on severance and fear and intimidation are anticipated to be negligible and not significant. Effects on pedestrian delay and amenity are anticipated to be minor adverse and not significant which will largely be associated with the pleasantness of journeys, particularly by cyclists using the NCR 410.

5.15.5 Highway improvements and junction upgrades proposed as part of the Proposed Development will help significantly reduce driver delay times at the A38 / Downside Road and A38 / West Lane

junctions. Delays are expected to decrease by up to 1 hour at peak times which is considered to be a 'very high' magnitude change and, therefore, there may be significant beneficial effects.

5.15.6 Increases in vehicle movements associated with the Proposed Development may cause a change in driver delay time of less than 20 seconds at junctions 1, 2, 3, and 5 and therefore no significant effects are anticipated at these locations. There will be an increase in delay of up to 12 minutes at Junction 6 (Barrow Lane) during the AM peak hour largely due to background traffic growth. However, given the nature of the surrounding area and receptors, it is not anticipated that this would result in significant effects. It should be noted that no airport traffic uses this route. Therefore, no overall significant effects are anticipated at the above locations.

5.15.7 No specific concerns regarding the geometric design or road layout of the local highway network in respect to accidents and safety have been identified. There is potential for there to be a minor beneficial effect at the A38/Downside Road/West Lane junction where a cluster of accidents was identified. This is due to proposed improvements to be provided at this location as part of the Proposed Development (for example signalisation of the A38/ West Lane junction).

Faster and Slower Growth Cases

5.15.8 A sensitivity test has been carried out to account for the potential variance in growth based on a Faster Growth Case of 12 mppa being reached in 2027, and a Slower Growth Case of 12 mppa being reached in 2034. This has shown that there would be no significant change in the future baseline conditions (**Table 5.4**).

5.15.9 Therefore, the conclusions and significance of effects are unchanged from the Core Case in the Faster and Slower Growth Cases.

5.16 Implementation of environmental measures

5.16.1 The implementation of environmental measures embedded within the Proposed Development remain unchanged from the original ES. These are presented in **Table 6.32** of the **Chapter 6: Traffic and Transport** of the original ES.

6. Noise and Vibration

6.1 Introduction

6.1.1 This chapter of the ES Addendum supplements **Chapter 7: Noise and Vibration** of the original ES (December 2018) and should be read in conjunction with this. The original ES concluded that the Proposed Development would give rise to **no significant adverse noise effects**. A small number of dwellings were forecast to experience a **significant beneficial effect** for ground noise, due to additional screening provided by infrastructure works.

6.1.2 The supplementary information contained here takes account of the following:

- Updated forecast aircraft fleet mix and movement numbers;
- Delay in the year that 10 mppa is first reached from 2021 to 2024;
- Delay in the year that 12 mppa is first reached from 2026 to 2030 (the Core Case assessment year);
- Associated change in forecast road traffic flows;
- In addition to the Core Case, a sensitivity test has been undertaken on a qualitative basis to a Faster Growth Case (2027) and a Slower Growth Case (2034).
- Updated information on the noise characteristics of the modernised fleet of aircraft; and
- Provision of additional explanatory information describing the potential noise effect of the Proposed Development during the night period.

6.1.3 This chapter presents and discusses the baseline (2017) noise environment at Bristol Airport in respect of air noise, ground noise, and road traffic noise, and considers the likely effects of changes in the future for scenarios both 'With' and 'Without' the Proposed Development. Within the sections of this chapter, the earlier assessment criteria and any updates to methodology are presented, the baseline noise conditions are discussed where relevant, and assessments are made of any effects (beneficial and adverse) associated with the Proposed Development.

6.1.4 No additional information is being provided in relation to the potential construction noise impacts from noise or vibration as no material changes are envisaged in the construction processes, sequencing or management of the works. Similarly, no further information is provided on potential vibration impacts of aircraft due to the similarities of the aircraft types in the updated air traffic forecasts. The assessment carried out for these topics in the original ES is considered robust and the conclusion of no significant effects is still considered valid.

6.2 Relevant legislation, planning policy, technical guidance

6.2.1 All legislation, planning policy and technical guidance set out in the original ES remains valid. Some new draft policy and technical guidance has been published since the completion of the ES which is summarised in this section.

Legislation

6.2.2 No new relevant legislation has come into force since the submission of the original ES.

Aviation Policy

Aviation 2050[28]

6.2.3 In December 2018, the Government published 'Aviation 2050: The Future of UK Aviation' (Aviation 2050) which outlines proposals for a new aviation strategy and addresses a wide range of associated issues. The Green Paper (among other things) sets out a robust policy framework and package of measures to reduce the harmful effects of aviation on the environment including in respect of noise. In the Green Paper, the Government recognises that there has been uncertainty on how current policy (to limit and, where possible, reduce the number of people in the UK significantly affected by aircraft noise) should be interpreted, measured and enforced. The Strategy sets out that the Government intends to put in place a stronger and clearer framework in order to ensure the sector is sufficiently incentivised to reduce noise, or to put mitigation measures in place where reductions are not possible. New measures are proposed including (among others):

- Setting a new objective to limit, and where possible, reduce total adverse effects on health and quality of life from aviation noise;
- Developing a new national indicator to track the long term performance of the sector in reducing noise;
- Routinely setting noise caps as part of planning approvals (for increases in passengers or flights); and
- Requiring all major airports to set out a plan which commits to future noise reduction, and to review this periodically.

6.2.4 Aviation 2050 also sets out that the Government proposes the following noise insulation measures:

- To extend the noise insulation policy threshold beyond the current 63dB $L_{Aeq,16h}$ contour to 60 dB $L_{Aeq,16h}$ (N.B. BAL already operate a scheme that goes beyond this recommendation, with a threshold of 57 dB $L_{Aeq,16h}$);
- To require all airports to review the effectiveness of existing schemes. This should include how effective the insulation is and whether other factors (such as ventilation) need to be considered, and also whether levels of contributions are affecting take-up;
- The Government or the Independent Commission on Civil Aviation Noise (ICCAN) to issue new guidance to airports on best practice for noise insulation schemes, to improve consistency (N.B. this has not yet been published);
- For airspace changes which lead to significantly increased overflight, to set a new minimum threshold of an increase of 3dB L_{Aeq}, which leaves a household in the 54 dB $L_{Aeq,16h}$ contour or above as a new eligibility criterion for assistance with noise insulation (N.B. even though this relates specifically to airspace change, which typically has a higher impact due to changes being instantaneous, no properties meet this criteria as part of the Proposed Development).

6.2.5 While Aviation 2050 describes the current intentions of the UK Government regarding the above measures, the final Aviation Strategy is still awaited and no fixed date for its publication is yet available.

[28] Department for Transport (2018) *Aviation 2050: The Future of UK Aviation*. Available from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/769695/aviation-2050-web.pdf [Accessed June 2020].

Aviation Strategy: Noise Forecast and Analyses, CAP 1731[29]

6.2.6 As part of the Aviation 2050 process, the Government commissioned the Civil Aviation Authority (CAA) to prepare CAP 1731 'Aviation Strategy: Noise Forecast and Analyses' which was published in December 2018 and subsequently updated in February 2019. The objective of the report was to undertake an assessment of the feasibility of implementing noise limits nationally and locally in the UK. One aspect included a review of noise metrics and limits to help devise targets or limits in order to control aircraft noise emissions, noise exposure and their associated health impacts. This led to a proposed limit scheme which in summary consists of:

1) A nationally set absolute Quota Count (QC) limit or noise contour area limit at a particular noise level both day and night, aggregated across all major airports;
2) A locally set absolute QC or noise contour area limit at a particular noise level for both day and night for each airport;
3) Local monitoring of the number of highly annoyed and highly sleep-disturbed people;
4) Reporting requirements.

6.2.7 It is of note that BAL currently, and as part of the application, proposes to control noise emissions in full compliance with 2) above, operating a noise contour area limit to control daytime noise and a QC limit (alongside additional aircraft movement restrictions) to control night noise. Any regular reporting requirements that were to arise under items 3) and 4) would be included in Bristol Airport's Annual Monitoring Report.

Technical Guidance

WHO Environmental Noise Guidelines for the European Region[30]

6.2.8 When the original ES was submitted, the World Health Organisation (WHO) had recently (October 2018) published their latest guidance document relating to aircraft noise, the Environmental Noise Guidelines for the European Region.

6.2.9 The WHO Guidelines contain the following recommendations:

*For average noise exposure, the GDG (*Guideline Development Group*) strongly recommends reducing noise levels produced by aircraft below 45 dB L_{den}, as aircraft noise above this level is associated with adverse health effects.*

For night noise exposure, the GDG strongly recommends reducing noise levels produced by aircraft during night-time below 40 dB L_{night}, as night-time aircraft noise above this level is associated with adverse effects on sleep.

6.2.10 These WHO guidelines could not be adopted as thresholds without imposing very significant restrictions on the current permitted operations of most major airports. As an example, even a single Airbus A320 or Boeing 737-800 aircraft operating once per night would expose hundreds of people to noise levels in excess of the guideline 40 dB L_{night} value at Bristol Airport, despite its relatively rural location. 10 aircraft events during the daytime (07:00-19:00) period (or smaller numbers in the evening and night periods) would expose a similar number of people to noise levels in excess of the 45 dB L_{den} parameter.

[29] Aviation Strategy: Noise Forecast and Analyses, CAP 1731, Civil Aviation Authority, 2018 from http://publicapps.caa.co.uk/docs/33/CAP1731AviationStrategyNoiseForecastandAnalyses_v2.pdf (Checked 22/10/2020).
[30] World Health Organization Regional Office for Europe (2018). Environmental Noise Guidelines for the European Region. [Online]. Available at: http://www.euro.who.int/__data/assets/pdf_file/0008/383921/noise-guidelines-eng.pdf [Checked: 14/10/2020].

6.2.11 These guidelines have not yet been adopted as UK policy, and there is no current indication that they will be. In December 2018, the UK Government published the consultation document Aviation 2050, which included the following regarding the WHO Guidelines:

"*3.106 There is also evidence that the public is becoming more sensitive to aircraft noise, to a greater extent than noise from other transport sources, and that there are health costs associated from exposure to this noise. The government is considering the recent new environmental noise guidelines for the European region published by the World Health Organization (WHO). It agrees with the ambition to reduce noise and to minimise adverse health effects, but it wants policy to be underpinned by the most robust evidence on these effects, including the total cost of an action and recent UK specific evidence which the WHO report did not assess*."

6.3 Scope of the assessment

6.3.1 The scope of this assessment is restricted to changes as a result of the updated forecast and information on the noise characteristics of the modernised fleet of aircraft, and the provision of additional explanatory information relating to the night period. The key aspects of the scope are summarised in this section and reference should otherwise be made to **Chapter 7** of the original ES.

Noise Indices

Primary indicators

6.3.2 The primary indicators assessed in the original ES have been re-assessed with the updated forecasts. These are:

- $L_{Aeq,16h}$, being the average A-weighted noise level during the daytime period (07:00-23:00), used for the air noise and ground noise assessments;
- $L_{Aeq,8h}$, being the average A-weighted noise level during the night time period (23:00-07:00), used for the air noise and ground noise assessments; and
- $L_{A10,18h}$, being the A-weighted noise level exceeded for 10% of the time during the 18-hour period between 06:00 and midnight, used for the road traffic noise assessment.

Supplementary indicators

6.3.3 A number of supplementary indicators were also provided as part of the original ES. These were for information and did not form the primary basis of the assessment of significance, rather they were provided to give context to the significance, helping to show how the noise environment will change between one scenario and another. A number of these supplementary indicators have been re-assessed with the updated forecasts, and these are listed below:

- Number of people likely to be highly annoyed;
- Number of people likely to be highly sleep disturbed;
- SEL and L_{ASmax} for the loudest typical (i.e. at least once per night) individual aircraft events in different scenarios;
- Variation in noise level at representative locations between scenarios.

6.3.4 The above indicators have been assessed for air noise only, with the exception of the variation in noise level at representative locations which has also been determined for ground noise and road traffic noise.

6.3.5 The supplementary indicators in the original ES which have not been re-assessed still provide context as intended, although their precise values would likely change slightly due to the updated forecasts.

6.3.6 During the period 23:30 to 06:00, Bristol Airport is currently restricted to 3,000 aircraft movements in the summer season (approximately seven months, defined as the period from late March to late October when British Summer Time is in effect) and 1,000 aircraft movements in the winter season (when Greenwich Mean Time is in effect). The Proposed Development seeks to keep the annual limit of 4,000 movements but remove the segregation of summer and winter periods. In the original ES, the assessment of the 12 mppa scenario was carried out on the basis that this change is approved, and it was therefore included in the overall effects in the 23:00-07:00 period.

6.3.7 Additionally, the original ES contained a detailed noise assessment of the night time period for each relevant scenario by showing how the air noise level was expected to vary hourly, throughout the night period from 23:00 to 07:00.

6.3.8 In response to a number of queries relating to this proposed change in the original application process, additional supplementary indicators have been used in this chapter of the ES Addendum to provide a further explanation of the forecast changes in noise level in the different periods of the night. Specifically, the following metrics have been used:

- $L_{Aeq,30m}$, being the average A-weighted noise level during the period 23:00-23:30;
- $L_{Aeq,6.5h}$, being the average A-weighted noise level during the period 23:30-06:00; and
- $L_{A10,1h}$, being the average A-weighted noise level during the period 06:00-07:00.

6.3.9 There are no commonly accepted criteria for rating the absolute noise levels of these metrics, so they have only been assessed based on the forecast change between scenarios.

Aircraft movements and scenarios

6.3.10 Four assessment scenarios are presented in this ES Addendum chapter. These are for the 2017 baseline, as presented in the original ES, and updated equivalents of the three future forecast scenarios presented in the original ES. The updated forecasts have been provided by York Aviation. The four assessment scenarios are:

- Baseline (taken to be 2017);
- 10 million passengers per annum (mppa) 'Without Development' in 2024;
- 12 mppa 'With Development in 2030'; and
- 10 mppa 'Without Development' in 2030.

6.3.11 The 10 mppa 2024 scenario is presented only for air noise. This is because it represents the likely worst case in terms of absolute air noise effects that are currently permitted. If Bristol Airport is constrained to 10 mppa then it would be expected that the air noise impact would reduce over time once this capacity is reached, as airlines replace their fleet with newer, quieter aircraft.

6.3.12 For the ground noise and road traffic noise assessments, there is not expected to be a material difference between 10 mppa in 2024 and 10 mppa in 2030, as the aircraft being quieter when airborne does not benefit these assessments.

6.3.13 A sensitivity test on a qualitative basis has also been carried out for Faster and Slower Growth Cases of 12 mppa in 2027 and 2034, respectively.

Summer and Annual Aircraft Movements

6.3.14 The number of summer aircraft movements associated with each of the scenarios for the daytime and night-time periods is given in **Table 6.1**, alongside the total number of annual movements. These totals are presented for all of the original ES scenarios, as well as for those assessed in the ES Addendum, in order to aid comparison. A breakdown of the number of aircraft movements by aircraft type in each ES Addendum scenario is given in **Appendix 6A**. The convention is to assess aircraft movements over a three month long summer period, specifically the 92 days from 16 June to 15 September inclusive. "Summer" in **Table 6.1** below relates to this three month summer period.

Table 6.1 Aircraft movements for assessment scenarios

Scenario	Number of Aircraft Movements		
	Summer Daytime (07:00-23:00)	Summer Night-time (23:00-07:00)[1]	Annual Total
Original ES Scenarios			
Baseline 2017	18,924	2,735	73,562
10 mppa 2021 (Without Development)	19,294	4,022	86,973
12 mppa 2026 (With Development)	22,540	4,639	97,393
10 mppa 2026 (Without Development)	19,294	4,022	86,973
ES Addendum Scenarios			
10 mppa 2024 (Without Development)	20,882	3,330	76,310
12 mppa 2030 (With Development)	23,164	3,940	85,990
10 mppa 2030 (Without Development)	20,424	3,210	74,380

Note: 1. This period is different to that which has a movement limit restriction, which is based on 23:30 to 06:00.

6.3.15 It is evident from the above table that 'Without Development', there will be no growth in aircraft movements at Bristol Airport beyond 2024 up to 2030, with a likely slight reduction in numbers. This is due to a general trend of "modernised" aircraft having higher seating capacities than those they replace, so fewer aircraft are required for the same number of passengers. For example, the Airbus A320neo has a higher standard seating capacity than the Airbus A320.

6.3.16 Comparing the totals for the ES Addendum scenarios with the equivalent original ES scenarios, the total aircraft movements in the summer daytime have remained similar, with small (<10%) increases compared to the original ES. However, the summer night time movements have reduced compared to the original ES, by 15-20%. The annual totals have also reduced compared to the original ES, by 10-15%. This change in the distribution of flights is due to an increased allowance in the updated forecast for general aviation flights, which primarily occur during the summer daytime period.

6.3.17 The main reason for the difference in annual totals compared to the original ES is that there have been changes in fleet mix leading to the average aircraft size being larger, rather than newer aircraft just having more seats. In particular, the number of Airbus A321neo aircraft has increased relative to the original ES, as many airlines are now opting for this aircraft rather than the smaller

Airbus A320neo. The number of smaller Embraer regional jet aircraft has also significantly decreased relative to the original ES, as these were primarily operated by flybmi who have now ceased operating.

Quota Count (QC) Period and Shoulder Period Aircraft Movements and QC Budgets

6.3.18 The Proposed Development does not seek any change to the existing Quota Count (QC) budgets for the summer and winter seasons. Such periods are also based on the same time criterion as the number of aircraft movements as explained above (23:30-06:00). The QC budgets are to remain at 1,260 in the summer and 900 in the winter.

6.3.19 The current limits on the number of aircraft movements and the Quota Count during the different periods of the night are summarised in **Table 6.2,** along with what is proposed to change under the Proposed Development.

Table 6.2 Summary of restrictions on night flights

Restriction	Current limit value	Proposed change
Quota Count (QC) total in "QC Period", i.e. 23:30 to 06:00	1,260 per summer (during BST) 900 per winter (during GMT)	No change to limits. Update QC scoring system to match latest used by CAA and reduce capacity to carry over unused quota from winter to summer.
Number of flights in "QC Period", i.e. 23:30 to 06:00	3,000 per summer (during BST) 1,000 per winter (during GMT)	No change to limit of 4,000 per year but remove seasonal restrictions
Number of flights in "shoulder periods", i.e. 23:00 to 23:30 and 06:00 to 07:00	10,500 per year	Reduce to 9,500 per year
Aircraft permitted to be scheduled in "QC Period", i.e. 23:30 to 06:00	QC 2 or lower	QC 1 or lower

6.4 Assessment Methodology

Assessment Activities

6.4.1 The original ES assessment for air noise was carried out using the Federal Aviation Administration (FAA) Aviation Environmental Design Tool (AEDT)[31] software version 2d, which was the latest version at the time. The assessment work for the ES Addendum has been carried out using version 3c of the software, which is currently the latest version. The underlying calculation methodology is broadly the same; however, since version 2d, data has been added into the model for new aircraft types, in particular for the Airbus A320neo and updated for the Boeing 737 MAX 8.

6.4.2 The forecasts used for the original ES contained three "modernised" aircraft for which reasonable assumptions were made based on information available at the time relating to their noise characteristics as they were not then in service at Bristol Airport. These were the Airbus A320neo, the Airbus A321neo, and the Boeing 737 MAX 8. In service data is now available for the two Airbus aircraft, and data measured at Bristol Airport's Noise Monitoring Terminals (NMTs) in 2019 has been used to update the assumptions made for these aircraft. The main effect of these changes is that the two Airbus aircraft are now being modelled as louder than they were in the original ES, by

[31] Federal Aviation Administration (2020). Aviation Environmental Design Tool (AEDT) Version 3c, [Online]. Available at: https://aedt.faa.gov/3c_information.aspx [Checked 01/10/2020].

approximately 1 dB for arrivals and 3 dB for departures. Details of the specific modelling assumptions used in this assessment is given in **Appendix 6A**.

6.4.3 The original ES assessment for ground and road traffic noise was carried out using the Datakustik CadnaA[32] software version 2017, which was the latest version at the time. The assessment work for the ES Addendum has been carried out using version 2020 of the software, which is currently the latest version. The updated software does not give rise to any material change in predicted noise levels for a common set of assumptions.

Noise assessment criteria

6.4.4 The same criteria have been adopted for this assessment as for the original ES as there has been no material change in Government policy since the planning application for the Proposed Development was submitted. In summary, levels were assigned to the Lowest Observed Adverse Effect Level (LOAEL), Significant Observed Adverse Effect Level (SOAEL) and Unacceptable Adverse Effect Level (UAEL), for each noise source. If a receptor is above the LOAEL, then it has the potential to be significantly impacted by the Proposed Development, depending on the magnitude of the change in noise level. Above the SOAEL, a smaller change is required for a significant effect to be found.

6.4.5 The criteria adopted for the original ES are summarised in the tables below. The LOAEL, SOAEL and UAEL values are given for residential receptors in **Table 6.3** for air noise and **Table 6.4** for ground noise and road traffic noise. The criteria for non-residential receptors are given in **Table 6.5.** The impact rating for the change in noise level is given in **Table 6.6.** How this translates into magnitude of effect is then given in **Table 6.7**.

Table 6.3 Air noise impact assessment criteria (absolute) – residential, outdoors

Subjective description of Impact	Daytime criteria $L_{Aeq,16h}$ dB	Night-time criteria $L_{Aeq,8h}$ dB	L_{ASmax} dB	SEL dB(A)	Description
Negligible (LOAEL)	51 (LOAEL)	45 (LOAEL)	60	70	More than 10-15 events per might
Very minor	54	48			
Minor	57	51			
Minor/Moderate	60	54			
Moderate (SOAEL)	63 (SOAEL)	55 (SOAEL)	80	90	More than one event per night
Substantial	66	60			
Very Substantial (UAEL)	69 (UAEL)	63 (UAEL)	90	100	More than one event per night

[32] DataKustik GmbH (2020). CadnaA - State-of-the-art Noise Prediction Software 2020 Version, [Online]. Available at: https://www.datakustik.com/en/products/cadnaa/ [Checked 1/10/2020].

Table 6.4 Ground and road traffic noise impact assessment criteria (absolute) – residential, outdoors

Subjective description of Impact	Ground Noise		Road Traffic Noise
	Daytime criteria, $L_{Aeq,16h}$ dB	Night-time criteria, $L_{Aeq,8h}$ dB	Criteria, $L_{A10,18h}$
Negligible (LOAEL)	50	45	55
Moderate (SOAEL)	60	55	68
Very Substantial (UAEL)	70	65	75

Table 6.5 Noise impact assessment criteria (absolute) – non-residential, outdoors

Receptor	External noise level threshold, air noise and ground noise
Schools	LOAEL = 55 dB $L_{Aeq,30min}$ (daytime)
Places of worship	As per daytime residential
Amenity areas	LOAEL = 55 dB $L_{Aeq,T}$

Table 6.6 Noise impact ratings - change in average noise level, outdoors

Change in noise level dB	Subjective impression	Potential Impact classification
0 to 2	Imperceptible change	Negligible
2 to 3	Barely perceptible change	Minor
3 to 6	Perceptible change	Moderate
6 to 9	Up to a halving or a doubling of loudness	Substantial
> 9	Equal to or more than a halving or doubling of loudness	Very substantial

Table 6.7 Summary of magnitude of effect

Noise Source	Outdoor noise level	Magnitude of effect				
		Very low	Low	Medium	High	Very High
		Change in noise level, dB(A)				
Air noise and ground noise	LOAEL ≤ Noise Level < SOAEL	0-2	2-3	3-5	5-10	>10
	Noise Level ≥ SOAEL	0-1	1-2	2-4	4-7	>7
Road traffic noise	Noise Level ≥ LOAEL	0-2	2-3	3-5	5-10	>10

6.4.6 A potential significant effect (adverse or beneficial) is considered to arise if in **Table 6.7** the magnitude of the effect is rated as medium or higher. Additionally, a change in the number of dwellings exposed to noise levels from individual events of the SOAEL or higher at least once per night is a potential significant effect. Whether a significant effect arises will depend on context, such as the number of noise sensitive receptors affected and how often it occurs.

6.5 Assessment of Operational Effects – Air Noise

Residential receptors – primary air noise indicators

$L_{Aeq,16h}$ daytime

6.5.1 The dwelling counts within key daytime air noise contours for the updated forecasts are presented in **Table 6.8**, alongside those for 2017 which were also presented in the original ES. The corresponding areas and population counts are given in **Appendix 6A**. These contours are presented in **Figure 6A.1** to **Figure 6A.3**.

Table 6.8 Air noise dwelling counts, $L_{Aeq,16h}$ average mode summer day

Contour $L_{Aeq,16h}$ dB(A)	**Number of Dwellings**			
	Baseline 2017	**10 mppa 2024 (Without Development)**	**12 mppa 2030 (With Development)**	**10 mppa 2030 (Without Development)**
51	3,250	3,200	3,100	2,600
63	20	20	10	10

6.5.2 **Table 6.8** shows that in 2017, around 3,250 dwellings were exposed to a daytime air noise level at or above the LOAEL of 51 dB $L_{Aeq,16h}$ as a result of aircraft operations at Bristol Airport. This total is expected to be marginally reduced in the 10 mppa (2024) scenario and further decrease in the 12 mppa scenario in comparison to the 2017 baseline. The 10 mppa (2030) scenario shows a reduction from 12 mppa, to around 2,600 properties.

6.5.3 Both in the baseline year of 2017 and in the future under any scenario, the number of residential receptors exposed to a daytime air noise at or above the SOAEL of 63 dB $L_{Aeq,16h}$ is very small, around 20 in 2017 and 2024 reducing to around 10 in 2030.

6.5.4 The results for the updated future forecasts are similar to those presented in the original ES for all scenarios other than 10 mppa 2030, which has a higher number of properties exposed to the LOAEL or above than the 10 mppa 2026 scenario presented in the original ES (2,200).

6.5.5 This change from the original ES is primarily because of the fact that in the original ES, a 10 mppa 2026 scenario was not specifically considered in the forecast, so the conservative assumption was made that from 2021 onwards, there would be no growth in passenger numbers from 10 mppa but fleet replacement would occur at the same rate as in the 12 mppa 2026 scenario. The updated forecasts used in this chapter have considered the 10 mppa 2030 scenario specifically and so provide a greater degree of accuracy, therefore such a conservative assumption is not required. These findings do not alter the conclusion in the original ES.

$L_{Aeq,8h}$ night-time

6.5.6 Turning to the night-time effects, **Table 6.09** shows the dwelling counts within key night-time air noise contours. The areas and population counts are given in **Appendix 6A**. These contours are presented in **Figure 6A.4** to **Figure 6A.6**.

Table 6.9 Air noise dwelling counts, $L_{Aeq,8h}$ average mode summer night

Contour $L_{Aeq,8h}$ dB(A)	Number of Dwellings			
	Baseline 2017	**10 mppa 2024 (Without Development)**	**12 mppa 2030 (with development)**	**10 mppa 2030 (Without Development)**
45	3,750	3,800	4,000	3,400
55	150	200	250	100

6.5.7 **Table 6.9** shows that in 2017, around 3,750 dwellings were exposed to a night-time air noise level at or above the LOAEL of 45 dB $L_{Aeq,8h}$ as a result of aircraft operations at Bristol Airport. This total is expected to remain similar in the 10 mppa (2024) scenario. The 12 mppa scenario gives rise to a similar, albeit slightly higher, number of dwellings compared to the 10 mppa (2024) scenario. The 10 mppa in 2030 scenario shows a reduction from 12 mppa, to around 3,400 properties.

6.5.8 In the baseline year of 2017, there were around 150 properties exposed to a night-time air noise level at or above the SOAEL of 55 dB $L_{Aeq,8h}$. This is predicted to increase to around 200 under the 10 mppa (2024) scenario, with a further increase to around 250 at 12 mppa. The 10 mppa (2030) scenario shows a reduction to around 100 properties since there is no material change in the number of aircraft movements at night over that in 2024 but the aircraft fleet is forecast to be further modernised.

6.5.9 The numbers of dwelling exposed to night-time air noise levels above the LOAEL or the SOAEL for the updated future forecasts are lower than those presented in the original ES, as the updated forecasts contain fewer night flights. The differences between the future scenarios are comparable to the original ES. These findings do not alter the conclusion in the original ES.

Residential receptors – supplementary air noise indicators

Annoyance

6.5.10 **Table 6.10** shows the number of people likely to be highly annoyed by air noise around Bristol Airport. This does not take account of any improved insulation for dwellings which have benefitted from the current BAL noise insulation grant scheme.

Table 6.10 Highly annoyed population count, $L_{Aeq,16h}$ average mode summer day

Metric	Baseline 2017	10 mppa 2024 (Without Development)	12 mppa 2030 (with development)	10 mppa 2030 (Without Development)
Population Highly Annoyed	750	750	700	600

6.5.11 **Table 6.10** shows that in the future, levels of annoyance will remain similar to 2017 under the 10 mppa 2024 scenario, with a slight reduction under the 12 mppa 2030 scenario, and a larger reduction under the 10 mppa 2030 scenario. This is because the reduction in noise level from newer aircraft more than offsets the increase in flights from 2017. These findings do not alter the conclusion in the original ES.

Sleep Disturbance

6.5.12 **Table 6.11**shows the number of people likely to be highly sleep disturbed by air noise around Bristol Airport. This does not take account of any improved insulation for dwellings which have benefitted from BAL's current noise insulation grant scheme.

Table 6.11 Highly sleep disturbed population count, L_{night} average mode annual night

Metric	Baseline 2017	10 mppa 2024 (Without Development)	12 mppa 2030 (With Development)	10 mppa 2030 (Without Development)
Population Highly Sleep Disturbed	450	450	500	400

6.5.13 This shows that in the future, the number of people highly sleep disturbed will be the same as 2017 under the 10 mppa 2024 scenario. There will be a slight increase in the number of people highly sleep disturbed in the 12 mppa 2030 scenario compared to the 2017 baseline, and a slight decrease when compared with the 10 mppa 2030 scenario.

6.5.14 The findings presented in Table 6.11 show a reduction in the number of people highly sleep disturbed in the future scenarios, in comparison with the original ES. Previously, the number of people highly sleep disturbed was expected to nearly double from 2017 to 850 in the 10 mppa 2021 scenario before reducing slightly to 800 in the 12 mppa 2026 scenario, and 600 in the 10 mppa 2026 scenario. These lower impacts reflect the lower number of night flights now forecast. These findings do not alter the conclusion in the original ES.

SEL and L_{ASmax}

6.5.15 The number of dwellings exposed to individual events of at least 90 dB SEL or 80 dB L_{ASmax} at least once per night is given in **Table 6.12** for each scenario.

Table 6.12 Air noise dwelling counts, individual events, average summer night

Contour, dB(A)	Number of Dwellings			
	Baseline 2017	10 mppa 2024 (Without Development)	12 mppa 2030 (With Development)	10 mppa 2030 (Without Development)
90 SEL	250	200	350	350
80 L_{ASmax}	250	200	500	500

6.5.16 **Table 6.12** demonstrates that from 2017 to the 10 mppa 2024 scenario, the number of dwellings exposed to noise levels of individual aircraft above the SOAEL at least once per night will decrease from around 250 to around 200. Going forward, this will increase to around 500 under the both the 10 mppa and 12 mppa scenarios in 2030 in comparison to the 2017 baseline.

6.5.17 The majority of dwellings exposed to noise levels of individual aircraft above the SOAEL at least once per night are due to departures using Runway 09. The loudest typical aircraft carrying out this operation is the Airbus A320 in 2017 and the 10 mppa (2024) scenario, but is the Airbus A321neo in the 10 mppa (2030) and 12 mppa scenarios, which is modelled as louder in some locations and includes a number of additional dwellings in Winford.

6.5.18 This is a change from the original ES, which forecast the louder Boeing 737-800 to operate at least once per night in the 10 mppa (2021) scenario, and the quieter Boeing 737 MAX 8 in the 10 mppa (2026) and 12 mppa scenarios.

6.5.19 The number of people exposed to a certain level is not expected to be materially affected by the Proposed Development as this does not permit any new aircraft types to operate, although it is possible that a particular aircraft type could be just under the threshold of one operation per night with 10 mppa, and just over this level of activity with 12 mppa. These findings do not alter the conclusion in the original ES.

Variation in air noise levels at representative residential receptors

6.5.20 To explore by how much noise exposure levels over the day and night are expected to change between different scenarios, noise predictions have been undertaken comparing various scenarios and the change expected at a series of representative residential receptors around Bristol Airport. The receptors assessed are shown on a map in **Figure 7.1** of the original ES.

6.5.21 **Table 6.13** shows the daytime air noise exposure levels for the baseline (2017) and the three future scenarios at representative residential receptors.

Table 6.13 Air noise exposure levels at representative residential locations, $L_{Aeq,16h}$ summer day

	Residential receptor	Absolute level ($L_{Aeq,16h}$) dB(A)			
		Baseline 2017	10 mppa 2024 (Without Development)	12 mppa 2030 (With Development)	10 mppa 2030 (Without Development)
1	Henley Park, Yatton	53	53	53	52
2	Bishops Road, Cleeve	54	53	53	52
3	Fountain Treeworks, Brockley	62	62	61	61
4	Cooks Bridle Path, Downside	61	61	61	60
5	Downside Road, Downside	60	60	59	58
6	School Lane, Lulsgate Bottom	62	62	61	60
7	Hillview Gardens, Felton	55	55	55	54
8	Market Place, Winford	59	59	60	59
9	Chew Magna, North Wick	54	54	54	53
10	Church Road, Norton Malreward	50	50	50	49
11	Lye Mead, Winford	53	53	53	53
12	Red Hill, Redhill	51	51	51	50

	Residential receptor	Absolute level ($L_{Aeq,16h}$) dB(A)			
		Baseline 2017	10 mppa 2024 (Without Development)	12 mppa 2030 (With Development)	10 mppa 2030 (Without Development)
13	Wrington Hill, Wrington	59	58	58	57
14	Southlands Way, Congresbury	53	53	52	52

6.5.22 The daytime results show that the 2017 baseline, the 10 mppa 2024 scenario and the 12 mppa 2030 scenario have similar air noise levels, and the 10 mppa 2030 scenario is quieter by a negligible amount (around 1 dB).

6.5.23 This finding is comparable to the original ES. There are a similar number of forecast aircraft movements in the three future scenarios compared to the original ES, and the effects of the changes to fleet mix and revised assumptions used for the new Airbus aircraft largely offset each other, so the resulting noise levels are similar.

6.5.24 **Table 6.14** shows the night-time air noise exposure levels for the baseline (2017) and the three future scenarios at representative residential receptors.

Table 6.14 Air noise exposure levels at representative residential locations, $L_{Aeq,8h}$ summer night

	Residential receptor	Absolute level ($L_{Aeq,8h}$) dB(A)			
		Baseline 2017	10 mppa 2024 (Without Development)	12 mppa 2030 (With Development)	10 mppa 2030 (Without Development)
1	Henley Park, Yatton	48	48	49	48
2	Bishops Road, Cleeve	48	48	49	48
3	Fountain Treeworks, Brockley	57	57	57	56
4	Cooks Bridle Path, Downside	56	56	56	55
5	Downside Road, Downside	54	54	55	54
6	School Lane, Lulsgate Bottom	57	56	57	56
7	Hillview Gardens, Felton	50	50	51	50
8	Market Place, Winford	55	55	55	55
9	Chew Magna, North Wick	50	50	50	50
10	Church Road, Norton Malreward	46	46	46	45
11	Lye Mead, Winford	49	49	50	49
12	Red Hill, Redhill	46	46	46	45
13	Wrington Hill, Wrington	53	53	54	52
14	Southlands Way, Congresbury	47	48	48	47

6.5.25 The night time results show that the 2017 baseline and the 10 mppa 2024 scenario have comparable air noise levels. The 12 mppa 2030 scenario is louder than the 2017 baseline by a negligible amount (0-1 dB) and the 10 mppa 2030 scenario is quieter by a negligible amount (0-1 dB).

6.5.26 This finding differs from the original ES, which forecast an increase of 1-2 dB from 2017 to the 10 mppa 2021 scenario, whereas now there is little change forecast. This is because the updated forecast contains fewer night flights. These findings do not alter the conclusion in the original ES.

Detailed night air noise levels

6.5.27 The original ES contained a detailed noise assessment of the night time period for each relevant scenario by showing how the air noise level was expected to vary hourly, throughout the night period from 23:00 to 07:00.

6.5.28 In response to a number of queries relating to this proposed change during determination of the planning application, additional supplementary indicators have been used in this chapter of the ES Addendum to provide a further explanation of the forecast changes in noise level in the different periods of the night

6.5.29 In the original ES, hourly noise levels were presented at the representative residential receptors in **Table 7D.81** to **Table 7D.89** to show how, during the different periods of the night, aircraft noise is likely to change between each of the key scenarios.

6.5.30 In this assessment for the ES Addendum, average 92-day summer noise levels have been computed at these receptors specifically for three periods of the night, being the "Quota Count (QC) period" of 23:30 to 06:00, and the two "shoulder periods" either side, being 23:00 to 23:30 and 06:00 to 07:00. This is to demonstrate how aircraft noise is likely to vary, for the future scenarios, during these three different periods of the night during the busier summer period.

6.5.31 In **Table 6.15** to **Table 6.17** below, the absolute level is given for the three future scenarios, for each of the time periods in turn.

Table 6.15 Detailed night air noise levels, 23:00-23:30

	Residential receptor	**Absolute level ($L_{Aeq,30m}$) dB(A)**		
		10 mppa 2024 (Without Development)	**12 mppa 2030 (With Development)**	**10 mppa 2030 (Without Development)**
1	Henley Park, Yatton	48	48	48
2	Bishops Road, Cleeve	44	44	44
3	Fountain Treeworks, Brockley	50	50	49
4	Cooks Bridle Path, Downside	53	54	53
5	Downside Road, Downside	47	47	46
6	School Lane, Lulsgate Bottom	53	53	52
7	Hillview Gardens, Felton	51	51	50
8	Market Place, Winford	60	60	60
9	Chew Magna, North Wick	56	56	55

	Residential receptor	Absolute level ($L_{Aeq,30m}$) dB(A)		
		10 mppa 2024 (Without Development)	12 mppa 2030 (With Development)	10 mppa 2030 (Without Development)
10	Church Road, Norton Malreward	51	51	51
11	Lye Mead, Winford	53	53	52
12	Red Hill, Redhill	42	42	42
13	Wrington Hill, Wrington	46	46	45
14	Southlands Way, Congresbury	46	46	45

Table 6.16 Detailed night air noise levels, 23:30-06:00

	Residential receptor	Absolute level ($L_{Aeq,6.5h}$) dB(A)		
		10 mppa 2024 (Without Development)	12 mppa 2030 (With Development)	10 mppa 2030 (Without Development)
1	Henley Park, Yatton	43	43	42
2	Bishops Road, Cleeve	39	40	39
3	Fountain Treeworks, Brockley	46	46	45
4	Cooks Bridle Path, Downside	48	48	48
5	Downside Road, Downside	43	43	43
6	School Lane, Lulsgate Bottom	48	48	47
7	Hillview Gardens, Felton	45	45	44
8	Market Place, Winford	54	54	53
9	Chew Magna, North Wick	49	49	49
10	Church Road, Norton Malreward	45	45	44
11	Lye Mead, Winford	46	47	46
12	Red Hill, Redhill	37	37	36
13	Wrington Hill, Wrington	42	42	41
14	Southlands Way, Congresbury	41	41	40

Table 6.17 Detailed night air noise levels, 06:00-07:00

	Residential receptor	Absolute level ($L_{Aeq,1h}$) dB(A)		
		10 mppa 2024 (Without Development)	12 mppa 2030 (With Development)	10 mppa 2030 (Without Development)
1	Henley Park, Yatton	56	56	55
2	Bishops Road, Cleeve	56	57	56
3	Fountain Treeworks, Brockley	65	66	65
4	Cooks Bridle Path, Downside	64	64	63
5	Downside Road, Downside	63	64	62
6	School Lane, Lulsgate Bottom	65	65	64
7	Hillview Gardens, Felton	58	58	57
8	Market Place, Winford	57	58	57
9	Chew Magna, North Wick	50	51	49
10	Church Road, Norton Malreward	47	48	46
11	Lye Mead, Winford	54	55	54
12	Red Hill, Redhill	54	55	54
13	Wrington Hill, Wrington	62	62	61
14	Southlands Way, Congresbury	56	56	55

6.5.32 The results in **Table 6.16** to **Table 6.17** show that the largest changes from the 10 mppa 2024 scenario to the 12 mppa 2030 scenario, of around 1 dB, occur in the 06:00 to 07:00 period. In the other two periods, almost all receptors see no change. The 10 mppa 2030 scenario is 1 dB quieter than the 12 mppa 2030 scenario at most receptors in all three periods, with no change at the others. All of these changes would be described as negligible based on the scale presented in **Table 6.6**.

6.5.33 Of particular note is the finding that, with a change in the summer season budget for the QC period, permitting 4,000 aircraft movements during the calendar year rather than 3,000 in the summer and 1,000 in the winter, gives rise to a negligible change in air noise during the QC period at night, and the change in this period is of a smaller magnitude than the change in the overall night period.

6.5.34 Therefore, the original ES finding of **no significant effects** during the night remains valid, whether considering the night as a whole (23:00 to 07:00), or the QC period (23:30 to 06:00) specifically, as the effects during the QC period are lower.

6.5.35 The above assessment considers the fourteen representative receptors around the airport. To ensure the findings of this analysis holds true for all receptors potentially affected by aircraft noise at night, three sets of difference contours have been generated comparing the three scenarios in the above table, which are shown in **Appendix 6A**.

6.5.36 The findings of these difference contours are that when comparing any two of the three scenarios, the differences are generally limited to less than 1 dB(A), with no differences greater than 2 dB(A). The largest differences are found in the 06:00 to 07:00 period, specifically changing from the 10 mppa 2030 scenario to the 12 mppa 2030 scenario, which shows an increase of 1-2 dB(A) for most areas, and 0-1 dB(A) for the rest. These findings do not alter the conclusion in the original ES that the effects are **not significant.**

Detailed night aircraft movements

6.5.37 To further illustrate the forecast changes in the night period, the number of forecast aircraft movements per night in the three night periods are presented in **Table 6.18** This shows that the proposed changes to the limit on the number of flights in the QC period during the summer is forecast to give rise to an additional three aircraft arrivals per night during this period, when comparing 12 mppa to 10 mppa (2024 or 2030). The increase to 12 mppa is also forecast to give rise to an additional three departures between 06:00 and 07:00 relative to 10 mppa (2024), or four relative to 10 mppa (2030).

6.5.38 This difference between 10 mppa and 12 mppa is consistent with the assessment carried out for the original ES, which presented a difference of six flights per summer night (23:00 to 07:00) between the 10 mppa and 12 mppa scenarios (the two 10 mppa scenarios in the original ES had the same number of flights).

Table 6.18 Aircraft Movements, Detailed Summer Night Periods

Scenario	Number of Aircraft Movements per Summer Night					
	23:00-23:30 (dB $L_{Aeq,30m}$)		23:30-06:00 (dB $L_{Aeq,6.5h}$)		06:00-07:00 (dB $L_{Aeq,1h}$)	
	Arrivals	Departures	Arrivals	Departures	Arrivals	Departures
10 mppa 2024 (Without Development)	5	0	15	1	0	15
12 mppa 2030 (With Development)	5	0	18	1	0	18
10 mppa 2030 (Without Development)	5	0	15	1	0	14

Non-residential receptors – air noise

6.5.39 **Appendix 6A** sets out the $L_{Aeq,16h}$ and, where relevant, the $L_{Aeq,8h}$ noise exposure levels for schools, places of worship and amenity areas within the zone of influence (Zoi) of air noise around Bristol Airport.

Schools

6.5.40 **Appendix 6A** identifies only one school, Winford Primary School, as being exposed to 55 dB $L_{Aeq,16h}$ or more, under all scenarios.

6.5.41 Strictly, the criteria relating to schools is required to be met over a 30-minute period, not over 16 hours. For a reasonable approximation, a one hourly value is appropriate to use for this purpose. From **Table 7D.105** in the original ES, it can be deduced that during the school hours, a one hourly L_{Aeq} value could be around 3 dB higher than the 16-hour average. However, even allowing for this fact, only this one school is exposed to noise levels above the LOAEL of 55 dB $L_{Aeq,1h}$ under the 2017

baseline and in the future. The noise level over the day at Winford Primary School in 2017 is 58 dB $L_{Aeq,16h}$ and will remain so in the 10 mppa 2024 and the 12 mppa 2030 scenarios. In the 10 mppa 2030 scenario the noise level drops to 57 dB $L_{Aeq,16h}$.

6.5.42 This finding is the same as the original ES.

Places of worship

6.5.43 There are 35 places of worship identified within the Zoi of air noise around Bristol Airport. Nine of these were exposed to air noise at or above the LOAEL of 51 dB $L_{Aeq,16h}$ in 2017. The situation will remain unchanged in the 10 mppa 2024 scenario, and reduce to six in both the 2030 scenarios. No places of worship are exposed to air noise at or above the SOAEL of 63 dB $L_{Aeq,16h}$, either in 2017 or in the future.

6.5.44 This finding is similar to the original ES, which found seven places of worship exposed to air noise at or above 51 dB $L_{Aeq,16h}$ in the 10 mppa (2021) scenario, and six in both the 2026 scenarios.

Amenity areas

6.5.45 There are 24 amenity areas identified within the Zoi of air noise around Bristol Airport. These vary in nature from playgrounds and parks, to open spaces. Nine of these receptors are were exposed to a daytime air noise level of 50 dB $L_{Aeq,16h}$ or more in 2017. Only three amenity areas were exposed to a daytime air noise level at or above the LOAEL of 55 dB $L_{Aeq,16h}$ or more in 2017, these being Cadbury Hill in Yatton, Vee Lane Play Area in Felton, and Felton Common.

6.5.46 This situation will remain broadly the same in the future. The number of those areas exposed to 50 dB and 55 dB remains the same in the 10 mppa 2024 scenario, reduces to eight and three respectively in the 12 mppa 2030 scenario, and reduces to eight and two (Vee Lane Play Area and Felton Common) in the 10 mppa 2030 scenario.

6.5.47 This finding is similar to the original ES, which found slight differences in the number of amenity areas exposed to 50 dB $L_{Aeq,16h}$ but no difference in those exposed to the LOAEL of 55 dB $L_{Aeq,16h}$.

Predicted air noise effects and their significance

6.5.48 The air noise effects arising from comparisons between different scenarios are presented in **Appendix 6A**. This section summarises the air noise effects and their significance arising from operations at Bristol Airport by comparing the following key scenarios for the Core Case:

- Future (10 mppa in 2024) vs future (12 mppa in 2030) 'With Development'; and
- Future (10 mppa in 2030) vs future (12 mppa in 2030) 'With Development'.

Comparison between scenarios

6.5.49 Detailed comparisons between the different scenarios, in the format presented in the original ES, are included in **Appendix 6A**. The conclusions for the comparisons between the 10 mppa and 12 mppa scenarios are summarised in the following sections.

Future (10 mppa in 2024) to Future (12 mppa in 2030) With Development

6.5.50 The air noise effects are not expected to materially change between the 10 mppa 2024 scenario, being the first year that the currently permitted capacity is forecast to be reached, and the 12 mppa 2030 scenario, being the first year that 12 mppa is forecast to be reached. During the day, all receptors are forecast to experience a negligible change in air noise level of less than 1 dB, with

more forecast to experience a decrease than an increase. At night, almost all receptors experience a negligible increase in air noise level of less than 1 dB. These findings do not alter the conclusion in the original ES that the effects are **not significant**, with reference to **Table 6.6**.

6.5.51 Approximately 200 dwellings are exposed to average night-time air noise levels at or above the SOAEL of 55 dB $L_{Aeq,8h}$ under the 10 mppa 2024 scenario. This number will increase to around 250 under the 12mppa 2030 scenario. All of these dwellings, however, will only experience negligible changes in noise level.

6.5.52 All of the dwellings exposed to external average air noise levels at or above the SOAEL, both in 2024 and 2030, are eligible under BAL's current noise insulation grant scheme and therefore have the option to improve the sound insulation to reduce the internal noise levels, if they have not done so already.

6.5.53 The number of dwellings exposed to noise levels due to individual aircraft events at or above the SOAEL, defined as exceeding 80 dB L_{Amax} or 90 dB SEL at least once per night on average, increases from around 200 under the 10 mppa 2024 scenario to around 500 under the 12 mppa 2030 scenario. Around 400 of these dwellings would be eligible to benefit from BAL's current noise insulation grant scheme, and many would also benefit from the improved offering at the new threshold of 55 dB $L_{Aeq,8h}$.

6.5.54 This general finding is similar to the original ES, albeit with a lower number of dwellings exposed to the night-time SOAEL, which was 300 in the 10 mppa 2021 scenario and 350 in the 12 mppa 2026 scenario. The number of dwellings exposed to noise levels due to individual aircraft events at or above the SOAEL in the original ES was higher at 650 in the 10 mppa 2021 scenario, and lower at 100 in the 12 mppa 2026 scenario. These changes are due to the reduction in forecast Boeing 737-800 night flights in 10 mppa 2024, and increase in the forecast Airbus A321neo night flights in 10 mppa 2030. It should be noted that the 12 mppa 2030 total is the same in the 10 mppa 2030 scenario. These findings do not alter the conclusion in the original ES that the effects are **not significant.**

Future (10 mppa in 2030) to Future (12 mppa in 2030) With Development

6.5.55 The air noise effects are not expected to materially change between the 10 mppa 2030 and 12 mppa 2030 scenarios. All assessed receptors experience negligible increases of less than 1 dB during the day and less than 2 dB at night. These changes are **not significant**, with reference to **Table 6.6**.

6.5.56 Approximately 100 dwellings are exposed to average night-time air noise levels at or above the SOAEL of 55 dB $L_{Aeq,8h}$ under the 10 mppa 2030 scenario. This number will increase to around 250 under the 12mppa 2030 scenario. All of these dwellings, however, will only experience a low or very low effect due to negligible changes in noise level.

6.5.57 All of the dwellings exposed to external average air noise levels at or above the SOAEL, in both scenarios, are eligible under BAL's current noise insulation grant scheme and therefore have the option to improve the property's sound insulation to reduce the internal noise levels, if they have not done so already.

6.5.58 The number of dwellings exposed to noise levels due to individual aircraft events at or above the SOAEL, defined as exceeding 80 dB L_{Amax} or 90 dB SEL at least once per night, is around 500 in both the 10 mppa 2030 and the 12 mppa 2030 scenarios. Around 400 of these dwellings would be eligible to benefit from BAL's current noise insulation grant scheme, and many would also benefit from the improved offering at the new threshold of 55 dB $L_{Aeq,8h}$.

6.5.59 Overall, there would be a lower number of dwellings exposed to the night-time SOAEL. The number of dwellings exposed to noise levels due to individual aircraft events at or above the SOAEL would

be higher than the original ES due to the increase in the forecast Airbus A321neo night flights, it would be the same for the 10 and 12 mppa 2030 scenarios. These findings do not alter the conclusion in the original ES that the effects are **not significant.**

6.6 Assessment of Operational Effects – Ground Noise

Residential receptors – primary ground noise indicators

$L_{Aeq,16h}$ daytime

6.6.1 The dwelling counts within key daytime ground noise contours for the updated forecasts are presented in **Table 6.19**, alongside those for 2017 which were also presented in the original ES. The corresponding areas and population counts are given in **Appendix 6A**. These contours are presented in **Figure 6A.20** and **Figure 6A.21**.

Table 6.19 Ground noise dwelling counts, $L_{Aeq,16h}$ average summer day

Contour $L_{Aeq,16h}$ dB(A)	Number of Dwellings		
	Baseline 2017	**10 mppa 2030 (Without Development)**	**12 mppa 2030 (With Development)**
50	70	90	100
60	1	1	1
70	0	0	0

6.6.2 **Table 6.19** shows that in 2017, around 70 dwellings were exposed to a daytime ground noise level at or above the LOAEL of 50 dB $L_{Aeq,16h}$ as a result of aircraft operations at Bristol Airport. This total is expected to increase to around 90 in the 10 mppa scenario and around 100 in the 12 mppa scenario.

6.6.3 Both in the baseline year of 2017 and in the future under any scenario, only one residential receptor is predicted to experience a daytime ground noise level above the SOAEL of 60 dB $L_{Aeq,16h}$, which is Core Hill, on Cooks Bridle Path to the north west of the western stands at Bristol Airport. This property has previously benefitted from BAL's noise insulation grant scheme.

6.6.4 No residential receptors were exposed to unacceptable levels of daytime ground noise in 2017, nor will they be in the future.

6.6.5 The number of properties exposed to the LOAEL or above in the future scenarios is slightly higher than presented in the original ES. This is because the forecast fleet mix is slightly different, and now contains more propeller aircraft which are the loudest category of aircraft for ground noise. These findings do not alter the conclusion in the original ES.

$L_{Aeq,8h}$ night-time

6.6.6 Turning to the night-time effects, **Table 6.20** shows the dwelling counts within key night-time ground noise contours. The corresponding areas and population counts are given in **Appendix 6A**. These contours are presented in **Figure 6A.22** and **Figure 6A.23**.

Table 6.20 Ground noise dwelling counts, $L_{Aeq,8h}$ average summer night

Contour $L_{Aeq,8h}$ dB(A)	Number of Dwellings		
	Baseline 2017	10 mppa 2030 (Without Development)	12 mppa 2030 (With Development)
45	70	100	90
55	1	1	2
65	0	0	0

6.6.7 **Table 6.20** shows that in 2017, around 70 dwellings were exposed to a night-time ground noise level at or above the LOAEL of 45 dB $L_{Aeq,8h}$ as a result of aircraft operations at Bristol Airport. This total is expected to increase in comparison to the 2017 baseline to around 100 in the 10 mppa scenario and around 90 in the 12 mppa scenario.

6.6.8 In the baseline year of 2017, only one residential receptor was predicted to experience ground noise above the SOAEL of 55 dB $L_{Aeq,8h}$, which is the same property as is exposed to the SOAEL in the daytime. This is predicted to remain the same under the 10 mppa scenario and increase to two dwellings under the 12 mppa scenario. The additional dwelling is The Lodge, also on Cooks Bridle Path.

6.6.9 No residential receptors were exposed to unacceptable levels of night-time ground noise in 2017, nor are they predicted to be in the future.

6.6.10 The number of properties exposed to the LOAEL and SOAEL or above in the future scenarios is slightly lower than presented in the original ES. This is because the updated forecast contains fewer night flights than the forecast used in the original ES. These findings do not alter the conclusions in the original ES.

Residential receptors – supplementary ground noise indicators

Variation in noise levels at representative residential receptors

6.6.11 To explore by how much noise exposure levels over the day and night are expected to change between different scenarios, noise predictions have been undertaken comparing the different scenarios and the change expected at a series of representative residential receptors around Bristol Airport. The receptors assessed are shown in **Figure 7.2** of the original ES.

6.6.12 **Table 6.21** and **Table 6.22** show the ground noise exposure levels at representative residential receptors for the baseline (2017), the 10 mppa 2030 scenario and the 12 mppa 2030 scenario, for the daytime and night-time periods respectively.

Table 6.21 noise exposure levels at representative residential locations, $L_{Aeq,16h}$ summer day

	Residential receptor	Absolute level ($L_{Aeq,16h}$) dB(A)			
		Baseline 2017	10 mppa 2030 (Without Development)	12 mppa 2030 (With Development)	Change 10 mppa vs 12 mppa
A	Cooks Bridle Path, Downside	61	62	63	+1

	Residential receptor	Absolute level ($L_{Aeq,16h}$) dB(A)			
		Baseline 2017	10 mppa 2030 (Without Development)	12 mppa 2030 (With Development)	Change 10 mppa vs 12 mppa
B	Downside Road, Lulsgate Bottom	58	59	52	-7
C	School Lane, Lulsgate Bottom	52	53	53	0
D	Red Hill (A38), Redhill	45	46	46	0
E	Winters Lane, Redhill	47	48	49	+1
F	Downside Road, Downside	53	53	55	+2
G	Downside Road, Downside	50	51	49	-2
H	Downside Road, Lulsgate Bottom	56	57	52	-5
I	Bridgwater Road (A38), Lulsgate Bottom	50	51	50	-1
J	Red Hill (A38), Redhill	43	43	44	+1
K	Winters Lane, Redhill	50	50	51	+1

Table 6.22 Ground noise exposure levels at representative residential locations, $L_{Aeq,8h}$ summer night

	Residential receptor	Absolute level ($L_{Aeq,8h}$) dB(A)			
		Baseline 2017	10 mppa 2030 (Without Development)	12 mppa 2030 (With Development)	Change 10 mppa vs 12 mppa
A	Cooks Bridle Path, Downside	56	59	60	+1
B	Downside Road, Lulsgate Bottom	52	53	47	-6
C	School Lane, Lulsgate Bottom	46	49	48	-1
D	Red Hill (A38), Redhill	39	40	41	+1
E	Winters Lane, Redhill	42	43	44	+1
F	Downside Road, Downside	49	49	50	+1
G	Downside Road, Downside	45	46	45	-1
H	Downside Road, Lulsgate Bottom	50	52	46	-6
I	Bridgwater Road (A38), Lulsgate Bottom	44	46	45	-1
J	Red Hill (A38), Redhill	37	38	39	+1
K	Winters Lane, Redhill	44	45	46	+1

6.6.13 The daytime results show that there is forecast to be a negligible increase in ground noise levels of around 1 dB from the 2017 baseline to the 10 mppa 2030 scenario. The difference from the 10 mppa 2030 to the 12 mppa 2030 scenario is more variable, with nine of the 11 receptors experiencing a negligible change in ground noise level, ranging from a 2 dB increase to a 2 dB decrease. The other two receptors experience greater decreases, one being moderate (5 dB) and the other being substantial (7 dB). These two receptors benefit from additional screening resulting from the Proposed Development being built out.

6.6.14 Considering the night time results, comparing 2017 to the 10 mppa 2030 scenarios, the ground noise level generally increases in the 10 mppa 2030 scenario by a negligible amount, although two receptors increase by a moderate amount and one does not change. Going from 10 mppa 2030 to 12 mppa 2030, nine of the 11 receptors experience a negligible change in ground noise level, ranging from a 1 dB increase to a 1 dB decrease. The other two receptors experience substantial decreases of 6 dB as they benefit from additional screening resulting from the Proposed Development being built out.

6.6.15 The 10 mppa and 12 mppa scenarios are both around 1 dB louder in the daytime and around 1 dB quieter at night than the original ES. These findings do not alter the conclusion in the original ES.

Detailed night noise levels

6.6.16 The average 92-day summer noise levels have been computed at each of the representative residential receptors assessed in **Table 6.21** to show how the noise level is likely to change between 23:30 and 06:00, which is the specific period of the night affected by the proposed change to the limit, which would keep the annual limit of 4,000 aircraft movements in this period but remove the limit of 3,000 in the summer season.

6.6.17 In **Table 6.23** below, the absolute level is given for the 10 mppa 2030 scenario in brackets, and the change in noise level is given for the 12 mppa 2030 scenario.

Table 6.23 Detailed night ground noise levels, 23:30-06:00

Receptor	Location	Absolute level ($L_{Aeq,6.5h}$) dB(A)	
		10 mppa 2030 (Without Development)	12 mppa 2030 (With Development)
A	Cooks Bridle Path, Downside	55	57
B	Downside Road, Lulsgate Bottom	50	43
C	School Lane, Lulsgate Bottom	45	45
D	Red Hill (A38), Redhill	37	37
E	Winters Lane, Redhill	41	40
F	Downside Road, Downside	46	47
G	Downside Road, Downside	43	41
H	Downside Road, Lulsgate Bottom	49	43
I	Bridgwater Road (A38), Lulsgate Bottom	43	42
J	Red Hill (A38), Redhill	35	35
K	Winters Lane, Redhill	43	43

6.6.18 The results in **Table 6.23** show that the absolute noise levels are lower than for the 8-hour night period, which is to be expected as the majority of the night time activity occurs in the "shoulder periods" of 23:00 to 23:30 and 06:00 to 07:00. The differences between the two scenarios show a similar pattern as the 8-hour night, with nine of the 11 receptors experiencing negligible changes of 0-2 dB(A), and the other two experiencing substantial decreases. These findings do not alter the conclusion in the original ES.

Non-residential receptors – ground noise

6.6.19 **Appendix 6A** sets out the $L_{Aeq,16h}$ and $L_{Aeq,8h}$ noise exposure levels for schools, places of worship and amenity areas within the ZoI of ground noise around Bristol Airport.

Schools

6.6.20 There are no schools identified within the ZoI of ground noise around Bristol Airport.

Places of worship

6.6.21 There are two places of worship identified within the ZoI of ground noise around Bristol Airport, which are St. Katharine's Church, Felton, and Christ Church, Redhill. Neither of these are exposed to ground noise at or above the LOAEL under any of the three scenarios.

Amenity areas

6.6.22 There are two amenity areas identified within the ZoI of ground noise around Bristol Airport. These are Vee Lane Play Area in Felton and Felton Common. Neither of these areas are exposed to

ground noise levels at or above the threshold level of 55 dB $L_{Aeq,16h}$ under any of the three scenarios.

Predicted ground noise effects and their significance

6.6.23 The ground noise effects arising from comparisons between different scenarios are presented in **Appendix 6A**. This section summarises the ground noise effects arising from operations at Bristol Airport by comparing the following key scenario for the Core Case:

- Future (10 mppa in 2030) vs future (12 mppa in 2030) 'With Development'.

Comparison between scenarios

6.6.24 Detailed comparisons between the different scenarios, in the format presented in the original ES, are included in **Appendix 6A**. The conclusions for the comparison between the 10 mppa and 12 mppa scenarios are summarised in the following sections.

Future (10 mppa in 2030) to Future (12 mppa in 2030) With Development

6.6.25 During the daytime, around 90 dwellings are exposed to ground noise levels at or above the LOAEL under the 10 mppa 2030 scenario, increasing to around 100 at 12 mppa. However, the majority of these receptors actually experience a negligible decrease in noise level of 0-2 dB(A) (while still remaining above the LOAEL), and around 30 receptors experience a moderate or substantial decrease, which constitutes a significant beneficial effect based on the criteria in **Table 6.6**. This benefit is due to screening provided by the new walkway to be constructed to the north of the existing eastern apron, as part of the Proposed Development.

6.6.26 During the night-time, a comparable number of properties above LOAEL are observed as the daytime, and a comparable number of properties experience a significant beneficial effect based on the criteria in **Table 6.6**, with no other properties experiencing any significant effects.

6.6.27 This finding does not alter the conclusion in the original ES that the overall effects are **not significant**, despite the significant beneficial effect for a small number of properties, which was also a finding of the original ES**.**

6.7 Assessment of Operational Effects – Road Traffic Noise

Residential receptors – primary road traffic noise indicators

6.7.1 The dwelling counts within key road traffic noise contours for the updated forecasts are presented in **Table 6.19**, alongside those for 2017 which were also presented in the original ES. The corresponding areas and population counts are given in **Appendix 6A**. These contours are presented in **Figure 6A.24** and **Figure 6A.25**.

Table 6.24 Road traffic noise dwelling counts, $L_{A10,18h}$

Contour $L_{A10,18h}$ dB(A)	Number of Dwellings		
	Baseline 2017	10 mppa 2030 (Without Development)	12 mppa 2030 (With Development)
55	100	150	150
68	20	40	40
75	2	5	5

6.7.2 **Table 6.19** shows that in 2017, around 100 dwellings in the vicinity of Bristol Airport were exposed to a road traffic noise level at or above the LOAEL of 55 dB $L_{A10,18h}$. This total is expected to increase to around 150 in the 10 mppa and 12 mppa scenarios.

6.7.3 In 2017, around 20 dwellings in the vicinity of Bristol Airport were exposed to a road traffic noise level at or above the SOAEL of 68 dB $L_{A10,18h}$. This total is expected to increase to around 40 in the 10 mppa and 12 mppa scenarios.

6.7.4 In 2017, two dwellings in the vicinity of Bristol Airport were exposed to a road traffic noise level at or above the SOAEL of 68 dB $L_{A10,18h}$. This total is expected to increase to five in the 10 mppa and 12 mppa scenarios.

6.7.5 The number of properties exposed to all levels are higher than the original ES, for example around 40 dwellings are now forecast to be above the SOAEL, compared to around 30 in the original ES. This is due to higher traffic flows in the updated forecast compared to the original ES. These findings do not alter the conclusions in the original ES.

Residential receptors – supplementary road traffic noise indicators

Detailed night noise levels

6.7.6 Hourly traffic flows have been provided for each of the roads assessed, and these have been used to estimate the flows in the QC period of 23:30 to 06:00. The additional flows due to the airport have been based on the busy day and are therefore inclusive of the potential effects of the proposed change to the summer limit, i.e. to keep the annual limit of 4,000 aircraft movements in this period but remove the limit of 3,000 in the summer season.

6.7.7 The flows for 2030 have been compared for the 10 mppa and 12 mppa scenarios in **Table 6.25**. This has been converted to a change in noise level based on the change in flow for each road.

Table 6.25 Road traffic flows, 23:30 to 06:00

Roads	6.5 hours AADT flows (23:30-06:00)		Approximate change in noise level, dB(A)
	10 mppa 2030 (Without Development)	12 mppa 2030 (With Development)	
R1 Downside Road	622	735	+0.7
R2 A38 (North of airport access)	2,127	2,328	+0.4

Roads	6.5 hours AADT flows (23:30-06:00)		Approximate change in noise level, dB(A)
	10 mppa 2030 (Without Development)	12 mppa 2030 (With Development)	
R3 Roundabout airport access	5,000	5,725	+0.6
R4 A38 (South of airport access)	6,650	7,606	+0.6
West Lane	879	1,012	+0.6
North Side Road (airport access)	6,224	7,242	+0.6

6.7.8 The changes in noise level presented in **Table 6.25** are all lower than 1 dB(A), which constitutes a very low effect for all receptors. These findings do not alter the conclusion in the original ES that the effects of road traffic noise are **not significant.**

Predicted road traffic noise effects and their significance

6.7.9 The road traffic noise effects arising from comparisons between different scenarios are presented in **Appendix 6A**. This section summarises the ground noise effects arising from operations at Bristol Airport by comparing the following key scenario for the Core Case:

- Future (10 mppa in 2030) vs future (12 mppa in 2030) 'With Development'.

Comparison between scenarios

6.7.10 Detailed comparisons between the different scenarios, in the format presented in the original ES, are included in **Appendix 6A**. The conclusions for the comparisons between the 10 mppa and 12 mppa scenarios are summarised in the following sections.

Future (10 mppa in 2030) to Future (12 mppa in 2030) With Development

6.7.11 The road traffic noise effects are not expected to materially change between the 10 mppa 2030 and 12 mppa 2030 scenarios. The road traffic noise levels are predicted to increase by less than 1 dB(A) for all assessed receptors.

6.7.12 Around 150 dwellings are exposed to road traffic noise levels at or above the LOAEL, and about 40 dwellings are exposed to road traffic noise levels at or above the SOAEL, in both the 10 mppa 2030 and 12 mppa 2030 scenarios. These dwellings all experience a negligible change in road traffic noise level.

6.7.13 These findings do not alter the conclusion in the original ES that the road traffic noise effects are **not significant.**

Faster and Slower Growth Cases

6.7.14 In addition to the Core Case considered in the above sections, consideration has been given to the Faster (2027) and Slower (2034) Growth Cases and how they would affect the conclusions of the assessment of the 2030 12mppa Core Case presented above. In summary, neither the Faster nor Slower Growth Case would change the conclusion that there are **no significant noise effects** expected to arise due to the Proposed Development.

Faster Growth Case

6.7.15 The Faster Growth Case results in a passenger throughput of 12 mppa first being reached in 2027. In this scenario, the 12 mppa scenario would differ from that assessed in this chapter by having less fleet modernisation, and a small (1-2%) increase in the number of flights, as the fleet modernisation results in the average aircraft size increasing.

6.7.16 The resulting air noise levels from the Faster Growth Case forecasts are expected to be greater than those assessed in this chapter by a magnitude of 0.5 dB(A) or less. There would be a similar change to the 10 mppa forecasts (2024 and 2030) assessed in this chapter, and therefore the differences between scenarios would be expected to remain similar to those assessed in this chapter, although contour areas would be larger by up to around 10%.

6.7.17 The ground noise assessment is based on the conservative assumption that the modernised aircraft are no quieter than existing aircraft. Therefore, the resulting ground noise levels from the Faster Growth Case forecast would increase by a small amount due to the 1-2% increase in flights. This equates to less than 0.1 dB(A) and would not materially change any of the assessment results or conclusions.

6.7.18 The road traffic noise assessment is primarily dependent on the number of passengers, rather than the number of flights. Non-airport traffic is forecast to increase over time; therefore, an earlier forecast year would see lower absolute noise levels, but a small increase in the relative difference between the 10 mppa and 12 mppa scenarios. The assessment in this chapter found increases of less than 1 dB(A) at all assessed receptors. An earlier forecast year would affect this by a fraction of a dB, and therefore would not exceed the 2 dB(A) threshold for significant effects.

6.7.19 The findings of the Faster Growth Case analysis do not alter the conclusions for the Core Case that the effects are **not significant.**

Slower Growth Case

6.7.20 The Slower Growth Case forecast results in a passenger throughput of 12 mppa first being reached in 2034. This would again affect both the 10 mppa and 12 mppa scenarios, and would have the opposite effect to the high growth forecast, by a similar magnitude. This would result in lower levels for air and road noise, and higher levels for road traffic noise, while still finding **no significant effects**.

6.7.21 The findings of the Slower Growth Case analysis do not alter the conclusions for the Core Case that the effects are **not significant.**

6.8 Summary of predicted effects and their significance

6.8.1 A summary of the results of the supplementary assessment of Noise and Vibration operational effects is provided in **Table 6.26**. These relate to the change from 'Without Development' to 'With Development' in 2030.

6.8.2 The finding of **no significant effects** is the same as the original ES.

Table 6.26 Summary of significance of effects

Source	Receptor type and assessment period	Magnitude of change[1] and beneficial or adverse	Significance[2]	Summary rationale
AIR NOISE	Residential – Day	Negligible (beneficial and adverse)	**Not significant**	A small number of dwellings are exposed to air noise levels above the SOAEL. Changes due to the development are negligible and therefore **not significant.**
	Residential – Night (long term average)	Negligible (beneficial and adverse)	**Not significant**	Although some dwellings are exposed to air noise levels above the SOAEL, changes due to the development are negligible and therefore **not significant.**
	Residential – Night (individual events)	Negligible (adverse)	**Not significant**	Although some dwellings are exposed to air noise levels above the SOAEL, the number exposed is forecast to be the same with or without the development in 2030, and therefore not significant.
	Schools	Negligible (adverse)	**Not significant**	One school is exposed to an air noise level above the LOAEL. Changes due to the development are negligible and therefore the effect is **not significant.**
	Places of Worship	Negligible (beneficial and adverse)	**Not significant**	A small number of places of worship are exposed to an air noise level above the LOAEL. Changes due to the development are negligible and therefore **not significant.**
	Amenity Areas	Negligible (beneficial and adverse)	**Not significant**	A small number of amenity areas are exposed to an air noise level above the LOAEL. Changes due to the development are negligible and therefore **not significant.**
GROUND NOISE	Residential – Day	Negligible (beneficial and adverse) + moderate (beneficial)	**Not significant**	One dwelling is exposed to a ground noise level above the SOAEL. Some dwellings experience a negligible increase in noise which is not significant. Around 30 dwellings experience moderate reductions in noise due to screening by the new development which are rated as significant. Overall, changes due to the development are generally negligible and therefore **not significant.**
	Residential – Night	Negligible (beneficial and adverse) + moderate (beneficial)	**Not significant**	A very small number of dwellings are exposed to a ground noise level above the SOAEL. Some dwellings experience negligible changes in noise which is not significant. Around 30 dwellings experience moderate reductions in noise due to screening by the new development which are rated as significant. Overall, changes due to the development are generally negligible and therefore **not significant**.
	Schools	N/A	**Not significant**	No schools are exposed to a ground noise level above the LOAEL.
	Places of Worship	N/A	**Not significant**	No places of worship are exposed to a ground noise level above the LOAEL.
	Amenity Areas	N/A	**Not significant**	No amenity areas are exposed to a ground noise level above the LOAEL.

Source	Receptor type and assessment period	Magnitude of change[1] and beneficial or adverse	Significance[2]	Summary rationale
ROAD TRAFFIC NOISE	Residential	Negligible (adverse)	**Not significant**	A small number of dwellings are exposed to a road traffic noise level above the SOAEL. Changes due to the development are negligible and therefore **not significant.**

1. The magnitude of change for a receptor resulting from activities relating to the development is defined using the criteria set out in **Section 6.4** and is defined as negligible, minor, moderate, substantial and very substantial.
2. The significance of the environmental effects is based on the combination of the sensitivity of a receptor, the absolute noise level and the magnitude of change and is expressed as very low, low, medium, high or very high, subject to the evaluation methodology outlined in **Section 6.4**. A significant effect arises with a rating of medium or higher.

6.8.3 These predicted effects are based on the quantitative assessment for the 2030 Core Case, but the conclusions are considered to be robust for the 2027 Faster Growth Case and 2034 Slower Growth Case.

6.9 Additional mitigation

6.9.1 The original ES found that there are no receptors subject to significant operational noise and vibration effects due to the change between the 'Without Development' (10 mppa) and 'With Development' (12 mppa) scenarios. This assessment has the same findings. Therefore, no further mitigation is required to reduce the noise and vibration effects that are identified in this ES Addendum.

6.9.2 However, some receptors are exposed to noise levels above the SOAEL and therefore BAL already has in place a number of mitigation measures, one of which is the noise insulation grant scheme.

6.9.3 In the original ES, BAL proposed to enhance this scheme as part of the Proposed Development, increasing the grant amount available by 50% and introducing an additional eligibility criterion of the 55 dB $L_{Aeq,8h}$ contour. This commitment remains unchanged.

6.9.4 There are **no residual significant effects** predicted.

6.10 Conclusions of significance evaluation

6.10.1 In conclusion, the assessments carried out in this ES Addendum chapter based on the Core Case generally show similar or lower impacts when compared to the original ES. The original ES finding of **no significant adverse effects** is unchanged. The mitigation offered as part of the original ES is still considered appropriate.

6.10.2 This conclusion is also valid for the Faster and Slower Growth Cases.

7. Air Quality

7.1 Introduction

7.1.1 This chapter of the ES Addendum supplements **Chapter 8: Air Quality** of the original ES (December 2018) which should be read in conjunction with this document. The original ES carried out an assessment of the air quality impacts of the Proposed Development based on the best information available at the time. The original ES concluded:

7.1.2 *"Overall, the air quality impacts are considered to be of moderate significance. Increases in annual mean NO_2 [nitrogen dioxide] result in impacts which are classified as moderate adverse in terms of the IAQM/EPUK [Institute of Air Quality Management/Environmental Protection UK] guidance at seven receptors, and slight adverse at a further 50 receptors, but there are no other significant air quality impacts at any human or ecological receptor."*

7.1.3 This supplementary information takes account of the following:

- Change in forecast passenger numbers; and
- Change in Assessment Year from 2026 to 2030 (year in which 12 mppa will be reached). 2030 is the Core Case assessed within this chapter; and
- A Faster Growth Case (where 12 mppa is reached in 2027) and a Slower Growth Case (where 12 mppa is reached in 2034) in comparison to the Core Case.

7.1.4 These changes mean that it has been necessary to update the air quality assessment. The quantitative assessment uses the Core Case of 2030 as the assessment year. Sensitivity testing of the Faster Growth Case (2027) and Slower Growth Case (2034) has been undertaken on a qualitative basis and is reported in **Section 7.7**.

7.2 Relevant legislation, planning policy and technical guidance

7.2.1 Most legislation, planning policy and technical guidance related to this assessment remains unchanged since the original ES, with the following exceptions.

Legislation

Environment Bill

7.2.2 The Environment Bill[33] is expected (at the time of writing) to receive Royal Assent in mid-2021. The Bill aims to set out an overarching framework for environmental law following the UK's departure from the European Union (EU). While specific legislation remains in force after BREXIT, the EU's acquis provided wider context, and some of its provisions no longer apply, for example the role of the European Commission and European Court in enforcing and reviewing compliance.

7.2.3 A key measure of the Bill is the creation of the Office for Environmental Protection (OEP) to provide oversight and enforcement of environmental legislation, as well as examining new environmental policies and investigating complaints. Enforcement will be done through a new kind of legal

[33] Parliament (2020) Environment Bill 2019-21. https://services.parliament.uk/Bills/2019-21/environment.html

mechanism, called an 'environmental review', that can compel public authorities to take action if a court finds they have breached environmental law.

7.2.4 With regard to air quality specifically, all legal limits will remain unchanged by the Bill for the time being. However, the Bill will impose a duty on the Secretary of State to set a new target for annual mean $PM_{2.5}$, plus at least one other new air quality target by October 2022, and then to ensure these targets are met. The targets must be chosen such that they can be met.

Planning policy

National Planning Policy Framework (NPPF)

7.2.5 Although the NPPF[34] has been revised following submission of the original ES, the principal policy around air quality (e.g. paragraph 181) has not changed.

Other policy

Aviation 2050

7.2.6 In 2018-2019, the Government consulted on its Green Paper, Aviation 2050[35]. In relation to air quality, the strategy proposes the following measures:

- improving the monitoring of air pollution, including ultrafine particles (UFP), in order to improve understanding of aviation's impact on local air quality;
- ensuring comprehensive information on aviation-related air quality issues is made available to better inform interested parties;
- requiring all major airports to develop air quality plans to manage emissions within local air quality targets;
- validation of air quality monitoring to ensure consistent and robust monitoring standards that enable the identification of long-term trends; and
- supporting industry in the development of cleaner fuels to reduce the air quality impacts of aviation fuels.

Clean Air Strategy 2019

7.2.7 The Clean Air Strategy 2019[36] was issued by Defra to describe the Government's approach to tackling air pollution in England. It runs parallel to the Air Quality Strategy but proposes that the Local Air Quality Management (LAQM) regime may be overhauled in future. It increases the emphasis on ammonia and $PM_{2.5}$ as pollutants of concern, including a commitment to halve the population living in areas with annual mean concentrations of fine particulate matter above the World Health Organization (WHO) guideline level (10 μg m^{-3}) by 2025.

7.2.8 It also considers the contribution to be made by various sectors. Aviation is briefly discussed, but the Clean Air Strategy largely defers to the Aviation Strategy. This strategy was issued in draft form at the time of the original ES.

[34] Ministry of Housing, Communities and Local Government (2019) National Planning Policy Framework.
[35] HM Government (2018) Aviation 2050: The future of UK aviation: A consultation. Cm9714, December 2018.
[36] Defra (2019) Clean Air Strategy 2019.

Technical Guidance

World Health Organization (WHO) guidelines

7.2.9 WHO guidance[37] contains a detailed review of available medical and epidemiological evidence about the health effects of air pollution. With regard to particulate matter (PM), it notes that "*there is little evidence to suggest a threshold below which no adverse health effects would be anticipated*" and so "*the standard-setting process needs to achieve the lowest concentrations possible in the context of local constraints, capabilities and public health priorities*." It offers numerical guideline values to "*provide guidance on the concentrations at which increasing and specified mortality responses due to PM are expected, based on current scientific insights*."

7.2.10 It suggests a guideline of 10 μg m^{-3} for annual mean $PM_{2.5}$ and a guideline of 25 μg m^{-3} for daily mean $PM_{2.5}$ as a 99th percentile. It notes that either of these may be more onerous than the other depending on local circumstances but adds that "*annual average is suggested to take precedence over the 24-hour average since, at low levels, there is less concern about remaining episodic excursions*."

7.2.11 Although this guidance predates the original ES, it was not adopted in any UK guidance at the time the original ES was submitted. At present, the only policy that refers to the WHO guidance is the Clean Air Strategy 2019.

7.3 Overall baseline

7.3.1 The current baseline assessment for 2017 is unchanged. The future baseline has been updated to account for the changed Assessment Year and updated versions of the Defra background maps and critical load data from the Air Pollution Information Service (APIS), as detailed in **Section 7.6**.

7.4 Embedded mitigation

7.4.1 Assumptions around embedded mitigation are unchanged from the original ES.

7.5 Scope of the Assessment

7.5.1 The scope of this assessment is restricted to changes as a result of the updated forecast, namely the change in the passenger forecasts and the change in Assessment Year to 2030. This has consequent changes to key assumptions, such as the aircraft and road traffic forecasts. In addition, since the original ES was prepared, a number of third-party sources of information have been updated. These changes have therefore been accounted for in the assessment for this Addendum.

7.5.2 The assessment considers a Core Case in which 12 mppa is reached in 2030, and the sensitivity test cases reported in **Section 7.6** reflect Faster and Slower Growth Cases in which 12 mppa is reached in 2027 and 2034, respectively.

7.5.3 Impacts from construction are not expected to be materially different from the original ES assessment. Whilst the construction year is later than that originally assessed, the amount of construction activity is unchanged. Emissions from construction plant engines were scoped out of the original ES, and the later construction year (in all Growth Cases) means emissions will be lower

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

due to continuing year-on-year improvements in emission factors from plant and equipment engines. This assessment is therefore only concerned with operational impacts.

7.6 Assessment methodology

7.6.1 The underlying methodology of the air quality assessment for the Core Case Assessment Year of 2030 is the same as the original ES. However, the change to the Assessment Year from 2026 means that some data used for the air quality modelling has been updated for the purposes of this Addendum, as follows:

- Updated forecast aircraft schedules. These consist of a forecast one-day schedule for 2030 for both 10 mppa and 12 mppa scenarios (i.e. Without Development and With Development respectively), plus total movements per year by aircraft type. For the air quality assessment, the daily schedule has been used to assign movements to each hour of the year, with an adjustment factor for each aircraft type to ensure that the total movements per year tallies with the forecast. For example, the one-day 12 mppa forecast includes 66 movements by the Airbus A320neo, and the total movements per year for this aircraft is given as 20,200, so each daily movement is adjusted by a factor of 20200 / (66 * 365) = 0.84. Non-commercial movements (e.g. positioning flights and general aviation) are included in the total annual movements.
- Updated road traffic forecasts (see **Chapter 4: Traffic and Transport** of the ES Addendum). These consist of forecasts of Annual Average Daily Traffic (AADT), for Light Duty Vehicles (LDVs) and Heavy Duty Vehicles (HDVs), on the network of road links that carry an appreciable amount of airport-related traffic. The air quality assessment in the original ES was focussed on the road network in the immediate vicinity of Bristol Airport, but NSC requested further information on air quality impacts from all roads included in the Transport Assessment. This additional information was provided to NSC in April 2019[38], and the present assessment includes the full modelled network. Diurnal profiles (number of vehicles by hour of day) were also provided, along with information on queue lengths at the principal road junctions affected by airport-related traffic.

7.6.2 In addition, in the two years since the original assessment was carried out, some third-party information used in the assessment has been updated. The following updates have been incorporated in the new assessment:

- Updated aircraft engine emissions data. This assessment uses version 27 of the International Civil Aviation Organization (ICAO) Aircraft Engine Emissions Databank[39].
- Emissions from road vehicles have been calculated using the latest version of ADMS-Roads, version 5.0[40], which incorporates the latest version, version 10.1, of the Defra Emission Factor Toolkit[41]. Emission factors for 2030 were used. For the original ES, the Calculator Using Realistic Emissions for Diesels (CURED) was used to adjust road vehicle emission factors within the assessment, but this is not recommended with the new emission factors, so it has not been used for the new assessment.

[38] Wood (2019) Development of Bristol Airport to Accommodate 12 Million Passengers Per Annum: Further Response to Comments on Air Quality.
[39] ICAO (2020). ICAO Aircraft Engine Emissions Databank, version 27, [online]. Available at: https://www.easa.europa.eu/domains/environment/icao-aircraft-engine-emissions-databank [Checked 01/09/2020].
[40] CERC (2020). ADMS-Roads, [online]. Available at: www.cerc.co.uk/environmental-software/ADMS-Roads-model.html [Checked 01/09/2020].
[41] Defra (2020). Emissions Factors Toolkit, [online]. Available at: https://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html [Checked 01/09/2020].

- The latest update (2018 reference year) of the Defra background concentration maps[42]. Background concentrations for 2030 are used.
- The latest information on deposition rates and critical loads from APIS[43] has been used.

7.6.3 For the Assessment Years corresponding to the Faster and Slower Growth Cases, i.e. 2027 and 2034, a qualitative assessment has been carried out, informed by the quantitative assessment for 2030. This uses expert judgement, informed by the quantitative results of the Core Case, the quantitative results of the original ES, and knowledge of trends in emissions and emission factors.

7.6.4 The pollutants considered are the same as in the original ES, namely:

- Nitrogen dioxide (NO_2), as annual mean and hourly mean;
- Particulate matter smaller than 10 µm diameter (PM_{10}), as annual mean and daily mean;
- Particulate matter smaller than 2.5 µm diameter ($PM_{2.5}$), as annual mean;
- Nitrogen deposition; and
- Acid deposition.

7.6.5 Assessment criteria are the same as the original ES, namely those recommended by the Institute for Air Quality Management (IAQM) and Environmental Protection UK (EPUK)[44] for human receptors, and by the Environment Agency (EA)[45] for ecological receptors.

7.6.6 Impacts have been assessed at a set of receptors representing locations where people or ecosystems are present and where there is potential for significant effects. The list of receptors is the same as that used in the original ES, combined with the additional receptors near to the full road network modelled to address the request for supplementary information from North Somerset Council (NSC) as described above[38]. Receptors are shown in **Appendix 7B.**

7.6.7 Since the original ES was prepared, a small number of receptors have been confirmed not to represent relevant exposure as they are not residential properties (receptor IDs H096, H097, H100 and H101), and the building represented by one receptor has been demolished (receptor ID H098). These receptors have been retained in the modelling but are excluded from the assessment of operational effects.

Assessment of $PM_{2.5}$

7.6.8 Since the original ES was submitted, there has been increased interest in, and concern, about the impacts of $PM_{2.5}$, for example in the Clean Air Strategy 2019 and the Environment Bill (**Section 7.2**). Current legislation, policy and guidance is focussed on an assessment level of 25 µg m^{-3} as an annual mean, so this is the primary criterion against which concentrations have been assessed.

7.6.9 The WHO guidance is referenced in the Clean Air Strategy as a commitment to "*reduce $PM_{2.5}$ levels in order to halve the number of people living in locations where concentrations of particulate matter are above 10 µg m^{-3} by 2025*". It has also been suggested that the new $PM_{2.5}$ target required under the Environment Bill may be to achieve the WHO guideline by, perhaps, 2030, but the Secretary of State would need to be satisfied that such a target can be met. In light of this, annual mean $PM_{2.5}$

[42] Defra (2020). Background Maps, [online]. Available at: https://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html [Checked 01/09/2020].
[43] Air Pollution Information System (APIS), [online]. Available at: www.apis.ac.uk [Checked: 01/09/2020].
[44] EPUK and IAQM (2017). Land-use Planning and Development Control: Planning for Air Quality, v1.2, [online]. Available at: http://www.iaqm.co.uk/text/guidance/air-quality-planning-guidance.pdf [Checked 01/09/2020].
[45] Environment Agency (2020). Air emissions risk assessment for your environmental permit, [online]. Available at: https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit [Checked 10/10/2020].

concentrations have also been compared against the level of 10 µg m^{-3} as a secondary criterion, but it should be borne in mind that this is not current policy.

7.7 Assessment of Operational Effects

7.7.1 This section sets out the results of the dispersion modelling and compares predicted concentrations against the assessment criteria for the revised Assessment Year and associated data. Most of this section presents quantitative results for the Core Case Assessment Year of 2030, while a qualitative assessment of the Faster and Slower Growth Case Assessment Years is presented at the end of this section (**Section 7.7**).

7.7.2 The predicted increase in concentrations resulting from the Proposed Development (known as the Process Contribution or PC) at each receptor is presented; this is the increment in concentrations in the 12 mppa scenario relative to the 10 mppa scenario. Also presented are the total Predicted Environmental Concentrations (PEC) for the 12 mppa scenario, which include the background contribution from sources unrelated to the Proposed Development. These concentrations are then compared with the relevant Air Quality Assessment Level (AQAL: standard, objective, target or guideline value).

7.7.3 Modelled concentrations include the contributions from operational activity within the airport boundary such as aircraft, Ground Support Equipment (GSE) and airport car parks. Outside the airport boundary, contributions from aircraft at height and road traffic on the modelled links (both airport-related and non-airport and including queues) are accounted for.

7.7.4 Results are given below for the receptors of greatest interest for each assessment criterion. Full results are available in **Appendix 7A**.

7.7.5 For ecological receptors, EA guidance[45] recommends two levels of assessment criteria depending on the level of designation of the ecological site. Sites with the highest designations, referred to in this report as major environmental sites, are:

- Special Areas of Conservation (SACs);
- Special Protection Areas (SPAs);
- Ramsar sites; and
- Sites of Special Scientific Interest (SSSIs).

7.7.6 Sites with lower designations, referred to by the EA as local nature sites, include National Nature Reserves (NNRs), Local Nature Reserves (LNRs), Local Wildlife Sites (LWSs) and ancient woodland (AW).

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

Human health effects: nitrogen dioxide (NO_2)

7.7.8 Predicted concentrations of annual mean NO_2 at selected receptors are given in **Table 7.1**. In view of the large number of modelled receptors, results are given in this table for only a selection of receptors (namely the five receptors with the highest PECs plus the five receptors with the highest PCs). Results for all receptors are given in **Appendix 7A**. Contour plots of total NO_2 concentrations for the 10 mppa and 12 mppa scenarios are shown in **Figure 7.1** and **Figure 7.2**.

Table 7.1 Maximum PCs and PECs for annual mean NO2

Receptor	AQAL (µg m^{-3})	PC (µg m^{-3})	PEC (µg m^{-3})	PC (% of AQAL)	PEC (% of AQAL)	Impact
H078	40	3.10	25.44	7.8%	63.6%	Slight
H092	40	-0.56	24.72	-1.4%	61.8%	Negligible
H099	40	0.18	29.03	0.4%	72.6%	Negligible
H102	40	2.44	24.08	6.1%	60.2%	Slight
H103	40	2.39	24.87	6.0%	62.2%	Slight
H060	40	2.41	21.99	6.0%	55.0%	Slight
H061	40	2.45	22.20	6.1%	55.5%	Slight
H078	40	3.10	25.44	7.8%	63.6%	Slight
H102	40	2.44	24.08	6.1%	60.2%	Slight
H103	40	2.39	24.87	6.0%	62.2%	Slight

Figure 7.1 Annual mean NO2 concentrations, 10 mppa scenario

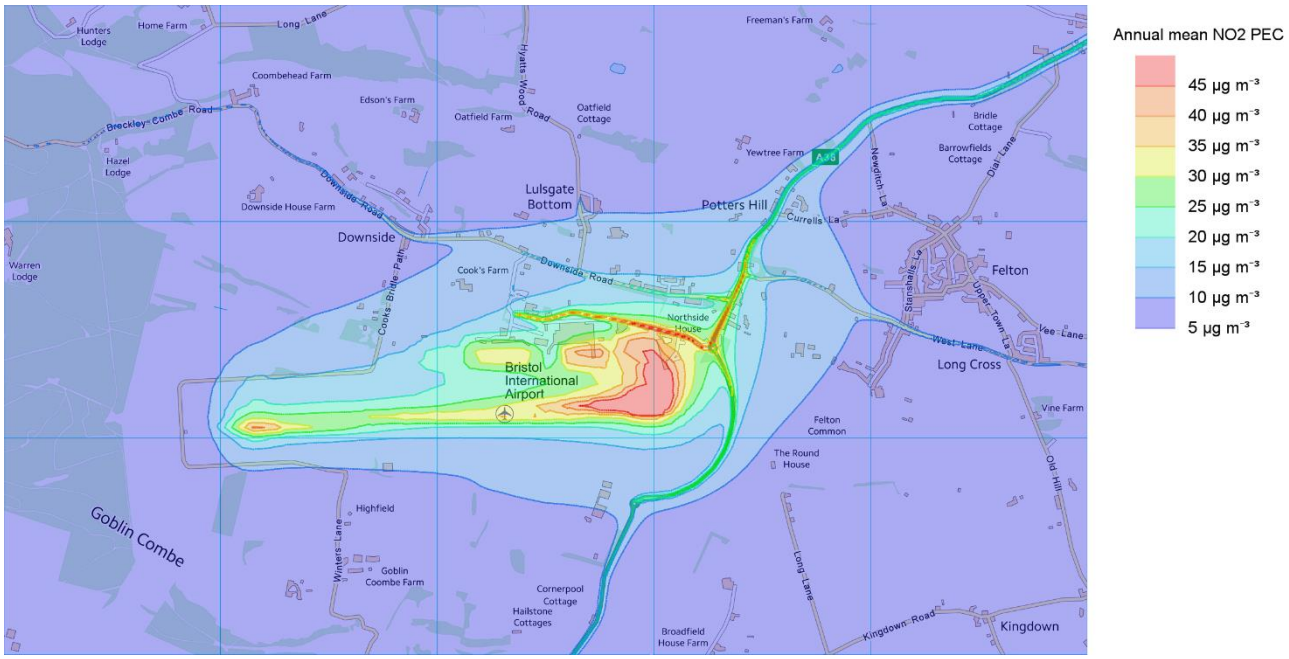
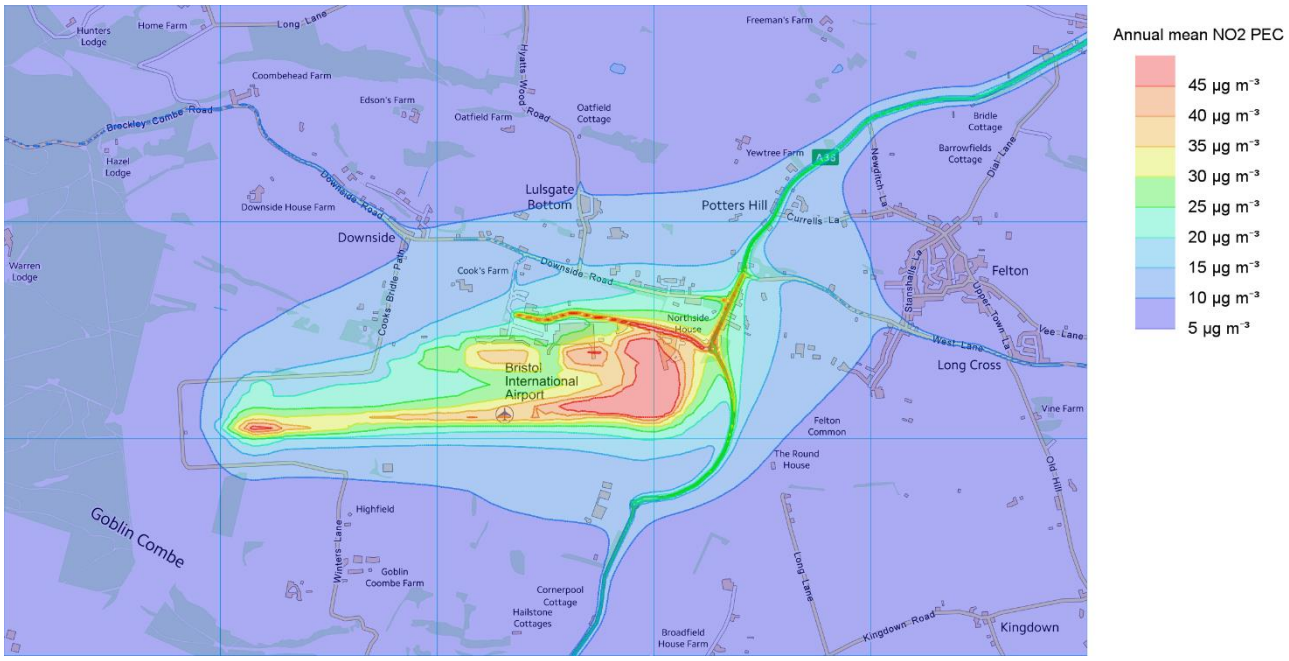


Figure 7.2 Annual mean NO2 concentrations, 12 mppa scenario



7.7.9 There are no receptors where the impact of annual mean NO_2 is modelled to be moderate or substantial under the IAQM/EPUK criteria, or where the annual mean NO_2 concentration is predicted to exceed the limit value of 40 µg m^{-3}. There are fourteen receptors where the impact is modelled to be **slight** under the IAQM/EPUK criteria. These are properties along Downside Road and close to the A38 road north of the airport. At all other receptors, the modelled impact is **negligible**.

7.7.10 The greatest PEC at any of the modelled receptors is 29 µg m^{-3} or 73% of the AQAL at the H099 receptor representing the old school building; the PC here is 0.2 µg m^{-3}, indicating a **negligible** impact from the Proposed Development.

7.7.11 The greatest PC at any of the modelled receptors is 3.1 µg m^{-3} at the H078 receptor representing the Airport Tavern; the PEC here is 25 µg m^{-3} or 64% of the AQAL. The impact here is **slight**. The PC is relatively large because the proposed improvements to the A38 in this location widen the road to the west, and so move traffic closer to the facade of the building.

7.7.12 Three receptors on the east side of the A38 experience reductions in concentrations, as the road realignment moves traffic slightly away from the facade of the properties. These reductions are classified as having a **negligible** impact.

7.7.13 Defra Technical Guidance TG(16)[46] suggests that where the annual mean NO_2 concentration is below 60 µg m^{-3}, it is unlikely that the one-hour AQAL would be exceeded. Modelled annual mean NO_2 concentrations at all receptors, including those where there is only short-term exposure, such as the Forge Motel (H095), are comfortably below 60 µg m^{-3}, so it is considered very unlikely that the one-hour mean NO_2 limit value will be exceeded.

[46] Defra (2018) Local Air Quality Management: Technical Guidance (TG16). February 2018.

Summary

7.7.14 Slight adverse impacts on annual mean NO_2 concentrations are predicted at fourteen receptors along Downside Road and close to the A38. No moderate or substantial adverse impacts are predicted. Concentrations at all receptors remain well below the limit value for annual mean NO_2, with the greatest modelled PEC being 29 µg m−3 or 73% of the AQAL. In addition, no new or existing exceedances of the hourly mean NO_2 AQAL are likely. There will therefore be **no significant effect** on this criterion.

Comparison with the original ES

7.7.15 In general, the modelled NO_2 concentrations and impacts are markedly lower than were predicted in the original ES. **There are now no moderate impacts predicted, and far fewer slight impacts.** The original ES predicted moderate impacts at seven[47] receptors, close to the A38 near the junction with Downside Road. These were:

- H078, Airport Tavern;
- H079, Oakwood House;
- H080, unnamed house south of Yew Tree Cottage;
- H081, Yew Tree B&B;
- H098, former school building (since demolished);
- H099, former school building; and
- H103, property between Downside Road and the A38.

7.7.16 The original ES concluded that in view of the 'moderate' impacts predicted at a small number of receptors, the overall significance was moderate adverse and significant. Due to the much lower impacts now being predicted, it is considered that the overall significance is **not significant**.

7.7.17 The contribution to concentrations from background sources is marginally lower due to the later year, and the contribution from aircraft is marginally higher due to the updated aircraft fleet forecast. The main difference accounting for the change in total NO_2 concentrations is the contribution from road traffic, which is much lower in this assessment than in the original ES. This is because the emission factors used for cars are much lower which partly reflects the later Assessment Year (2030 rather than 2026) and improvement of emission factors over time, but mainly reflects changes relating to the performance of Euro 6c cars.

7.7.18 The original ES used road traffic emission factors for oxides of nitrogen (NO_x) from CURED[48]. These emission factors were developed in response to a consistent pattern whereby the emission factors for cars in Defra's Emission Factor Toolkit (EFT) underestimated real-world emissions. This in turn derived in part from real-world emissions being much higher than those measured in engine certification tests. This has been recognised as an issue for more than a decade, and the latest car engine certification standard, known as Euro 6c, includes a real-world measurement aspect.

7.7.19 The Euro 6c standard entered into force in September 2018, following the earlier Euro 6b in 2015, so at the time of the original assessment and the development of CURED V3A, it was not known what the real-world performance of Euro 6c cars would be. CURED appears to have taken a

[47] Including the former school building, which has since been demolished.

[48] Air Quality Consultants (2018). Updated CURED to V3A, [online]. Available at: http://www.aqconsultants.co.uk/News/January-2018/UPDATED-CURED-TO-V3A.aspx [Checked: 22/03/2018].

cautious approach and assumed that Euro 6c engines would not deliver much improvement in emissions compared to the preceding engine standards.

7.7.20 It is now evident that the real-world performance of Euro 6c cars is successfully delivering improved NO_x emission performance. CURED has been withdrawn and general expert opinion is that the latest versions of the EFT provide a valid basis for estimating future emissions. The emission performance of Euro 6c cars is important because by the assessment year of 2030, they will make up a large proportion of the vehicle fleet.

7.7.21 As an example, the 2030 fleet-average NO_x emission factor for LDVs (cars and light vans) at 80 km/h is more than twice as high using CURED V3A than using EFT v10.1 (6.44×10^{-5} g s^{-1} km^{-1} compared to 2.76×10^{-5} g s^{-1} km^{-1}). For 2026, the CURED figure is 7.14×10^{-5} g s^{-1} km^{-1}. The difference at other speeds is similar. This means that a reduction in car emissions of around 60% between the original ES assessment (2026) and the current assessment (2030) is therefore expected, solely due to the change in emission factors, without considering changes in modelled flows.

7.7.22 With regard to modelled emissions from HDVs, CURED and EFT v10.1 agree much more closely, so there is little difference between the two assessments. However, NO_x emissions from HDVs are not much greater than emissions from cars, per vehicle, so the total road emissions are dominated by cars.

7.7.23 Note that this substantial change in emission factors only relates to NO_x emissions and therefore NO_2 concentrations. Emission factors for PM_{10} and $PM_{2.5}$ have also been updated to EFT v10.1, but for these pollutants, the difference is only small.

7.7.24 A further reason for differences between the original ES and the current assessment lies in the modelling of traffic queues. For the original ES, quantitative information on future traffic queues was not available, so both 10 mppa and 12 mppa scenarios used baseline queue data from 2018 surveys, with the assumption that the A38 improvements would only counteract the growth in traffic, not provide any net benefit. The latest traffic modelling (see **Chapter 4: Traffic and Transport** of the ES Addendum) shows that the improvements associated with the Proposed Development would substantially reduce the queues in the 12 mppa scenario. Using the new data reduces the contribution of queues to air pollutant concentrations at receptors near the junctions between the A38 and the Airport Roundabout, Downside Road and West Lane.

Human health effects: PM_{10}

7.7.25 Predicted concentrations of annual mean PM_{10} at all the modelled receptors are classified as having a **negligible** impact under the IAQM/EPUK criteria. Concentrations for the five receptors with the highest PEC plus the five receptors with the highest PC are given in **Table 7.2**(Note that H081 is in the top five for both PEC and PC.) A full set of results is given in **Appendix 7A**.

Table 7.2 Maximum PCs and PECs for annual mean PM10

Receptor	AQAL (µg m^{-3})	PC (µg m^{-3})	PEC (µg m^{-3})	PC (% of AQAL)	PEC (% of AQAL)	Impact
H081	40	0.34	17.38	0.8%	43.4%	Negligible
H082	40	0.27	16.56	0.7%	41.4%	Negligible
H086	40	0.26	16.44	0.7%	41.1%	Negligible
H087	40	0.30	16.77	0.7%	41.9%	Negligible
H099	40	-0.35	16.31	-0.9%	40.8%	Negligible

Receptor	AQAL (µg m^{-3})	PC (µg m^{-3})	PEC (µg m^{-3})	PC (% of AQAL)	PEC (% of AQAL)	Impact
H078	40	0.81	15.81	2.0%	39.5%	Negligible
H079	40	0.31	14.61	0.8%	36.5%	Negligible
H080	40	0.35	15.69	0.9%	39.2%	Negligible
H103	40	0.31	14.35	0.8%	35.9%	Negligible

7.7.26 The maximum annual mean PM_{10} PEC at any relevant human receptor location is predicted as 17 µg m^{-3}, or 43% of the AQAL at the H081 (A38 3) receptor. The modelled increment from the Proposed Development here is just 0.3 µg m^{-3}. The greatest PC is 0.8 µg m^{-3} at the H078 (Airport Tavern) receptor, where the total PEC is 16 µg m^{-3} or 40% of the AQAL.

7.7.27 The number of days per year with a daily mean PEC concentration over 50 µg m^{-3} is estimated to be less than 3 at all receptors. This compares with a limit value of 35 days per year permitted to be over 50 µg m^{-3}.

7.7.28 No existing or new exceedances are predicted, and the maximum concentrations are well below the AQALs and will have a **negligible** impact. It is concluded that there is no risk of an exceedance of either the annual mean or daily mean limit values for PM_{10}, so impacts are **not significant**.

Summary

7.7.29 No new or existing exceedances of the annual mean PM_{10} limit value or the daily mean PM_{10} limit value are predicted. Impacts are negligible at all modelled receptors. There will therefore be **no significant effects** on this criterion.

Comparison with the original ES

7.7.30 There are some minor variations to the modelled PM_{10} concentrations and impacts predicted in the original ES assessment, largely due to the later Assessment Year. However, the conclusions of the assessment remain unchanged from the original ES; there are **no significant effects** on this criterion.

Human health effects: $PM_{2.5}$

7.7.31 Predicted concentrations of annual mean $PM_{2.5}$ at all the modelled receptors are classified as having a **negligible** impact under the IAQM/EPUK criteria. Concentrations for the five receptors with the highest PEC plus the five receptors with the highest PC are given in **Table 7.3**. A full set of results is given in **Appendix 7A**.

Table 7.3 Maximum PCs and PECs for annual mean PM2.5

Receptor	AQAL (µg m^{-3})	PC (µg m^{-3})	PEC (µg m^{-3})	PC (% of AQAL)	PEC (% of AQAL)	Impact
H099	25	-0.19	9.94	-0.7%	39.8%	Negligible
HR051	25	0.09	10.15	0.3%	40.6%	Negligible
HR052	25	0.08	10.11	0.3%	40.4%	Negligible

Receptor	AQAL (µg m^{-3})	PC (µg m^{-3})	PEC (µg m^{-3})	PC (% of AQAL)	PEC (% of AQAL)	Impact
HR056	25	0.07	9.95	0.3%	39.8%	Negligible
HR062	25	0.07	9.86	0.3%	39.4%	Negligible
H078	25	0.49	9.62	2.0%	38.5%	Negligible
H079	25	0.19	8.88	0.8%	35.5%	Negligible
H080	25	0.21	9.46	0.8%	37.9%	Negligible
H081	25	0.20	9.48	0.8%	37.9%	Negligible
H103	25	0.21	8.82	0.8%	35.3%	Negligible

7.7.32 The maximum annual mean $PM_{2.5}$ PEC at any relevant human receptor location is predicted as 10 µg m^{-3} or 40% of the AQO at the HR051 receptor, representing a property on the A38 Bridgwater Road in Bedminster Down. The modelled increment from the Proposed Development here is 0.1 µg m^{-3}. The greatest PC is 0.5 µg m^{-3} at the H078 (Airport Tavern) receptor, where the total PEC is 10 µg m^{-3} or 38% of the AQO, due to the road realignment moving traffic closer to the receptor.

7.7.33 Comparing annual mean concentrations against the WHO guideline of 10 µg m^{-3}, the PEC is above the guideline at two receptors (which were not modelled in the original ES), HR051 as mentioned above and HR052, representing a neighbouring property. At both of these receptors, the $PM_{2.5}$ concentration is greater than 10 µg m^{-3} in both 10 mppa and 12 mppa scenarios. At all other modelled receptors, including those in the vicinity of Bristol Airport, the annual mean $PM_{2.5}$ concentration is predicted to meet the WHO guideline. There are no new exceedances of the WHO guideline, so the Proposed Development is consistent with the target in Defra's Clean Air Strategy to halve the number of people living in locations where concentrations of particulate matter are above 10 µg m^{-3} by 2025.

7.7.34 No existing or new exceedances of the AQO are predicted, and the maximum concentrations are well below the AQO with a **negligible** impact, so there is no risk of an exceedance of the annual mean AQO for $PM_{2.5}$. Concentrations are within the WHO guideline at all but two receptors in both 12 mppa and 10 mppa scenarios. It is concluded that impacts are **not significant**.

Summary

7.7.35 No new or existing exceedances of the annual mean $PM_{2.5}$ objective are predicted. Impacts are negligible at all modelled receptors. There will therefore be **no significant effects** on this criterion.

Comparison with the original ES

7.7.36 There are some minor variations to the modelled $PM_{2.5}$ concentrations and impacts predicted in the original ES assessment. However, the conclusions of the assessment remain unchanged from the original ES; there are **no significant effects** on this criterion.

Ecological effects: Annual mean nitrogen oxides (NO_x) concentrations in air

7.7.37 Predicted concentrations of annual mean NO_x at selected receptors are given in **Table 7.4**. In view of the large number of modelled receptors, results are given in this table for only a selection of receptors, namely the three major environmental site receptors and the three local nature site receptors for which the PEC and PC is predicted to be highest (note that of the major sites, E09 is in

the top three for both PEC and PC, and of the local sites, E16 and E36 are in the top three for both PEC and PC). Results for all receptors are given in **Appendix 7A**.

Table 7.4 Maximum PCs and PECs for annual mean NO_x, worst receptors

Receptor	AQAL (µg m^{-3})	PC (µg m^{-3})	PEC (µg m^{-3})	PC (% of AQAL)	PEC (% of AQAL)	Site type	Impact
E08	30	0.12	16.05	0.4%	53.5%	Major	Not significant
E09	30	0.27	15.96	0.9%	53.2%	Major	Not significant
E12	30	0.51	15.02	1.7%	50.1%	Major	Not significant
E11	30	0.35	13.73	1.2%	45.8%	Major	Not significant
E13	30	0.27	13.65	0.9%	45.5%	Major	Not significant
E15	30	-13.39	54.98	-44.6%	183.3%	Local	Not significant
E16	30	2.86	26.88	9.5%	89.6%	Local	Not significant
E36	30	1.20	21.23	4.0%	70.8%	Local	Not significant
E24	30	1.06	13.68	3.5%	45.6%	Local	Not significant

7.7.38 Considering first the major environmental receptors (Ramsar, SPAs, SACs and SSSIs), the maximum annual mean NO_x PEC is predicted as 16 µg m^{-3}, or 53% of the AQAL at the E08 (North Somerset & Mendip Bats 6 SAC; King's Wood and Urchin Wood 2 SSSI) receptor. The modelled increment from the Proposed Development here is 0.1 µg m^{-3}. The greatest PC at any of the modelled nationally- or internationally-designated ecological receptors is 0.5 µg m^{-3} at the E12 (Goblin Combe 2 SSSI) receptor, where the PEC is 15 µg m^{-3}. Since the PEC is less than 70% of the AQAL at all the major receptors, under EA guidance, this impact is **not significant**.

7.7.39 Turning to the local nature receptors (i.e. LNR, AW and LWS), the maximum annual mean NO_x PEC is predicted as 55 µg m^{-3} or 183% of the AQAL at the E15 (Felton Common 1 LNR) receptor. The PC here is -13 µg m^{-3}. This reduction in concentration compared to the 10 mppa scenario is because the widening of the A38 road moves emissions slightly further away from the receptor, and reduces emissions from queuing traffic. The concentrations here are relatively high because this receptor represents the corner of the LNR next to the pavement alongside the A38. Concentrations fall rapidly with distance from the road, and at E16, which is 140 m from the road, the PEC is below the AQAL at 27 µg m^{-3}, and at E18 in the centre of the LNR, the PEC is close to background levels at 14 µg m^{-3} or 47% of the AQAL. At all Felton Common receptors, the PC is less than 100% of the AQAL, so under EA guidance, the impact is **not significant**.

7.7.40 At all other local nature receptors, concentrations are well below the AQAL. The greatest PEC at a local receptor other than Felton Common is 21 µg m^{-3} or 71% of the AQAL at the E36 (Heall's Scars) receptor. Under EA guidance, the impact at these receptors is not significant.

7.7.41 Except for parts of Felton Common, no existing or new exceedances are predicted at any of the modelled receptors. Under EA guidance, the impact at all receptors can be considered **not significant** and no further assessment is necessary.

Summary

7.7.42 Parts of Felton Common close to the A38 are predicted to exceed the limit value for annual mean NOx, due to the existing baseline. At all other receptors, concentrations are well below the limit value. Under EA criteria[45], the impact at all ecological receptors, including Felton Common, is not significant. There will therefore be **no significant effects** on this criterion.

Comparison with the original ES

7.7.43 In general, the modelled NO_x concentrations and impacts are slightly lower than those predicted in the original ES assessment, for similar reasons to annual mean NO_2 as discussed above. More appreciable differences are observed for the Felton Common receptor, which is very close to the A38 road, where this assessment predicts markedly lower concentrations than the original ES. However, the conclusions of the assessment remain unchanged from the original ES; there are **no significant effects** on this criterion.

Ecological effects: Maximum daily mean NO_x concentrations in air

7.7.44 Because of the large number of emissions sources, it has not been possible to model daily mean NO_x concentrations. Instead, concentrations have been estimated using the guideline suggested by the EA[45] and Defra[46] that short-term concentrations are approximately double the corresponding annual mean concentrations. Given that emissions from Bristol Airport are broadly uniform over the course of a year, apart from day and night variations, this is considered a reasonable approximation for airport-related emissions.

7.7.45 Predicted concentrations of annual mean NO_x at selected receptors are given in **Table 7.5.** In view of the large number of modelled receptors, results are given in this table for only a selection of receptors, namely the three major environmental site receptors and the three local nature site receptors for which the PEC and PC is predicted to be highest (note that of the major sites, E12 is in the top three for both PEC and PC, and of the local sites, E16 and E36 are in the top three for both PEC and PC). Results for all receptors are given in **Appendix 7A**.

Table 7.5 Maximum PCs and PECs for daily mean NOx, worst receptors

Receptor	AQAL (µg m^{-3})	PC (µg m^{-3})	PEC (µg m^{-3})	PC (% of AQAL)	PEC (% of AQAL)	Site type	Impact
E08	200	0.24	32.09	0.1%	16.0%	Major	Not significant
E09	200	0.54	31.91	0.3%	16.0%	Major	Not significant
E12	200	1.02	30.04	0.5%	15.0%	Major	Not significant
E11	200	0.69	27.47	0.3%	13.7%	Major	Not significant
E13	200	0.55	27.30	0.3%	13.7%	Major	Not significant
E15	200	-26.79	109.96	-13.4%	55.0%	Local	Not significant
E16	200	5.73	53.77	2.9%	26.9%	Local	Not significant

Receptor	AQAL (µg m^{-3})	PC (µg m^{-3})	PEC (µg m^{-3})	PC (% of AQAL)	PEC (% of AQAL)	Site type	Impact
E36	200	2.40	42.46	1.2%	21.2%	Local	Not significant
E24	200	2.12	27.37	1.1%	13.7%	Local	Not significant

7.7.46 Considering first the major environmental receptors (Ramsar, SPAs, SACs and SSSIs), the maximum daily mean NO_x PEC is predicted as 32 µg m^{-3}, or 16% of the AQAL at the E08 (North Somerset & Mendip Bats 6 SAC; King's Wood and Urchin Wood 2 SSSI) receptor. The modelled increment from the Proposed Development here is 0.2 µg m^{-3}. The greatest PC at any of the modelled nationally- or internationally-designated ecological receptors is 1.0 µg m^{-3} at the E12 (Goblin Combe 2 SSSI) receptor, where the PEC is 30 µg m^{-3} or 15% of the AQAL. Since the PC is less than 10% of the AQAL, under EA guidance, this impact is **not significant**.

7.7.47 Turning to the local nature receptors (i.e. LNR, AW and LWS), the maximum daily mean NO_x PEC is predicted as 110 µg m^{-3} or 55% of the AQAL at the E15 (Felton Common 1 LNR) receptor. The PC here is -27 µg m^{-3}, which is a reduction in concentration compared to the 10 mppa scenario as a result of the widening of the A38 road which moves emissions slightly further away from the receptor. The PC and PEC concentrations here are relatively high because this receptor represents the corner of the LNR next to the pavement alongside the A38. Concentrations fall rapidly with distance from the road. At all local nature receptors, the PC is less than 100% of the AQAL, so under EA guidance, the impact is **not significant**.

7.7.48 No existing or new exceedances are predicted at any of the modelled receptors. Under EA guidance, the impact at all receptors can be considered **not significant**.

Summary

7.7.49 At all receptors, concentrations are not expected to exceed the target for daily mean NO_x. There will therefore be **no significant effects** on this criterion.

Comparison with the original ES

7.7.50 In general, the modelled NO_x concentrations and impacts are slightly lower than those predicted in the original ES assessment, for similar reasons to annual mean NO_2 as discussed above (paragraph 7.7.17 onwards.). More appreciable differences are observed for the Felton Common receptor, which is very close to the A38 road, where this assessment predicts markedly lower concentrations than the original ES. The conclusions of the assessment remain unchanged from the original ES; there are **no significant effects** on this criterion.

Ecological effects: nutrient nitrogen deposition

7.7.51 Modelled nutrient nitrogen deposition rates at selected receptors are given in **Table 7.6**, along with the receptor-specific critical loads. In view of the large number of modelled receptors, results are given in this table for only a selection of receptors, namely the three major environmental site receptors and the three local nature site receptors for which the PEC and PC is predicted to be highest (as a percentage of the receptor-specific critical load). It should be noted that of the major receptors, E06 is in the top three for both PEC and PC, and of the local receptors, E17 is in the top three for both PEC and PC. Results for all receptors are given in **Appendix 7A**.

Table 7.6 Maximum PCs and PECs for nitrogen deposition

Receptor	AQAL (kg N ha^{-1} y^{-1})	PC (kg N ha^{-1} y^{-1})	PEC (kg N ha^{-1} y^{-1})	PC (% of AQAL)	PEC (% of AQAL)	Site type	Impact
E03	10.00	0.00	37.10	0.0%	371.0%	Major	Not significant
E06	10.00	0.03	30.83	0.3%	308.3%	Major	Not significant
E07	10.00	0.01	30.81	0.1%	308.1%	Major	Not significant
E11	15.00	0.05	30.85	0.3%	205.7%	Major	Not significant
E12	15.00	0.08	27.24	0.5%	181.6%	Major	Not significant
E17	5.00	0.08	22.34	1.7%	446.9%	Local	Not significant
E19	5.00	0.04	22.30	0.8%	446.0%	Local	Not significant
E28	10.00	0.12	36.66	1.2%	366.6%	Local	Not significant
E16	5.00	0.22	17.86	4.4%	357.2%	Local	Not significant
E36	10.00	0.18	29.86	1.8%	298.6%	Local	Not significant

7.7.52 Nutrient nitrogen background deposition rates at all of the modelled receptors are modelled to be at exceedance already, based on background deposition rates from APIS and without any additional contribution from the Proposed Development. No account is taken of reductions in deposition rates in future years.

7.7.53 At the major environmental sites, the additional PC is less than 1% at all the modelled receptors. Under EA guidance, where the PC at a major site is less than 1% of the critical load, it can be considered **not significant** and does not need to be assessed further.

7.7.54 At the local nature sites, the additional PC is less than 5% of the critical load. This is less than 100% of the assessment level, so under EA guidance for local nature sites, it can be considered **not significant** and does not need to be assessed further.

7.7.55 It is therefore concluded that the impacts on nitrogen deposition are **not significant** at any receptor.

Summary

7.7.56 While exceedances of the critical loads for nitrogen are predicted at all receptors, these are due to existing deposition rates and the additional contribution from the Proposed Development is **not significant** at any receptor. There will therefore be **no significant effects** on this criterion.

Comparison with the original ES

7.7.57 In general, the modelled nitrogen deposition rates and impacts are slightly lower than those predicted in the original ES. The conclusions of the assessment remain unchanged from the original ES; there are **no significant effects** on this criterion.

Ecological effects: acid deposition

7.7.58 Modelled PC and background deposition rates are given in **Table 7.7**. A comparison with the AQAL is given in **Table 7.8**[49]. For acid deposition, the AQAL is the site-specific critical load function, which is therefore different for each receptor. In view of the large number of modelled receptors, results are given in this table for only a selection of receptors, namely the three major environmental site receptors and the local nature site receptors for which the PEC and PC is predicted to be highest (as a percentage of the receptor-specific critical load function). Results for all receptors are given in **Appendix 7A**.

Table 7.7 Acid deposition rates

Receptor	Sulphur PC (keq ha^{-1} y^{-1})	Nitrogen PC (keq ha^{-1} y^{-1})	Sulphur background (keq ha^{-1} y^{-1})	Nitrogen background (keq ha^{-1} y^{-1})	Site type
E03	0	0.0001	0.21	2.65	Major
E04	0	0.0001	0.21	2.15	Major
E08	0	0.0010	0.18	2.15	Major
E11	0	0.0037	0.15	1.28	Major
E12	0	0.0058	0.17	1.14	Major
E13	0	0.0029	0.17	1.14	Major
E26	0	0.0037	0.22	2.61	Local
E28	0	0.0086	0.22	2.61	Local
E40	0	0.0037	0.22	2.61	Local
E16	0	0.0156	0.18	1.26	Local
E21	0	0.0097	0.21	1.94	Local
E41	0	0.0086	0.19	2.20	Local

[49] These are calculated using the same formulas as the APIS critical load function tool, but without rounding of intermediate values, so results may differ slightly from those generated by the website tool.

Table 7.8 Acid deposition: comparison with critical loads

Receptor	Exceedance (keq ha^{-1} y^{-1})			Percent of critical load function			Impact
	PC	Background	PEC	PC	Background	PEC	
E03	No exceedance	0.76	0.76	0.0	136.2	136.2	Not significant
E04	No exceedance	0.26	0.26	0.0	112.4	112.4	Not significant
E08	No exceedance	No exceedance	No exceedance	0.0	89.6	89.7	Not significant
E11	No exceedance	No exceedance	No exceedance	0.1	29.2	29.3	Not significant
E12	No exceedance	No exceedance	No exceedance	0.1	26.7	26.9	Not significant
E13	No exceedance	No exceedance	No exceedance	0.1	26.7	26.8	Not significant
E26	No exceedance	No exceedance	No exceedance	0.1	46.4	46.5	Not significant
E28	No exceedance	No exceedance	No exceedance	0.1	46.4	46.5	Not significant
E40	No exceedance	No exceedance	No exceedance	0.1	46.4	46.5	Not significant
E16	No exceedance	No exceedance	No exceedance	0.4	33.2	33.6	Not significant
E21	No exceedance	No exceedance	No exceedance	0.2	35.8	36.0	Not significant
E41	No exceedance	No exceedance	No exceedance	0.1	39.7	39.9	Not significant

7.7.59 Acid deposition rates at two of the modelled receptors, E03 (North Somerset & Mendip Bats 1 SAC) and E04 (North Somerset & Mendip Bats 2 SAC), are predicted to be higher than the relevant AQALs, based on background deposition rates from APIS and without any additional contribution from the Proposed Development. No account is taken of reductions in deposition rates in future years. The PC at these receptors is less than 0.005% of the AQAL.

7.7.60 At the major environmental sites, the greatest PC is 0.1% of the AQAL at the E12 (Goblin Combe 2 SSSI) receptor, where the PEC is 27% of the AQAL. Since the PCs at all major receptors are less than 1% of the AQAL, under EA guidance the impacts at these receptors can be considered **not significant**.

7.7.61 At the local nature sites, the additional PC is at most 0.4% of the AQAL, at the E16 (Felton Common 2 LNR) receptor. The PEC here is modelled as 34% of the AQAL. The greatest PEC at a local nature site is 47% of the AQAL at the E28 (High Wood AW) receptor. Since the PCs at all local receptors are less than 100% of the AQAL, under EA guidance for local wildlife sites, the impacts at these receptors can be considered **not significant**.

7.7.62 Under the EA criteria, the impacts at all modelled receptors, both major and local, can be considered **not significant** and do not need to be assessed further.

Summary

7.7.63 While exceedances of the critical loads for acidity are predicted at two receptors, these are due to existing deposition rates and the additional contribution from the Proposed Development is **not significant** at all receptors. There will therefore be **no significant effects** on this criterion.

Comparison with the original ES

7.7.64 In general, the modelled acid deposition rates and impacts are slightly lower than those predicted in the original ES assessment. The conclusions of the assessment remain unchanged from the original ES; there are **no significant effects** on this criterion.

Faster and Slower Growth Cases

7.7.65 The quantitative assessment presented above has been based on the 2030 Core Case. Consideration has also been given to two sensitivity tests to examine whether the effects of faster (i.e. earlier) or slower (i.e. later) growth to 12 mppa makes any material change to the effects reported above. In the Faster Growth Case, the airport is forecast to reach a throughput of 12 mppa in 2027 and in the Slower Growth Case the airport reaches a throughput of 12 mppa in 2034.

7.7.66 The quantitative assessment presented above shows that the most critical air pollutant for the Proposed Development is NO_2, the only pollutant for which there are impacts that cannot be considered negligible. This means that the air quality at the most sensitive locations in the vicinity of Bristol Airport over the next ten years will largely be driven by the increasing proportion of Euro 6 standard cars on the roads. As cars built before 2018 are replaced with newer cars, concentrations of NO_2 at the key roadside receptors will fall, increasing the headroom below the air quality standard. Other improvements, such as the increase in electric vehicles, improvements in aircraft engine emissions, and reduced emissions from industrial and domestic sources, will also contribute to an increase in headroom. The quantitative modelling presented above demonstrates that by 2030, growth to 12 mppa will be possible while remaining comfortably within the air quality objectives and causing only slight impacts.

7.7.67 If 12 mppa is reached in the Faster Growth Case of 2027, then background concentrations will be slightly higher as various emission control measures have less time to take effect (e.g. the introduction of Euro 6 cars). The contribution from airport-related road traffic and aircraft is also likely to be slightly higher than in the 2030 Core Case. This means the headroom will be slightly lower and the impacts will be greater. However, the quantitative assessment shows that the margin is sufficiently large, and the impacts are sufficiently small in 2030, that bringing the assessment year forward to 2027 is unlikely to lead to significant impacts. Moreover, the original ES used 2026 as the assessment year, and found moderate impacts, but this used very pessimistic emission factors for cars, so can be considered an extreme worst case. Overall, it can be concluded that there would be no risk of any air quality objectives being exceeded.

7.7.68 Clearly, if 12 mppa is reached in the Slower Growth Case of 2034, the headroom will be greater (as emission control measures have longer to take effect) and the impacts will be smaller, and will remain not significant.

7.7.69 The other pollutant of potential concern is $PM_{2.5}$, where concentrations are close to the WHO guideline. The quantitative assessment shows that the contribution to $PM_{2.5}$ concentrations from Bristol Airport is very small indeed, and concentrations are dominated by the background. There has been less regulatory pressure to reduce $PM_{2.5}$ concentrations than there has for NO_2 (for example, standards for emissions of particulate from cars have not changed since 2013) with the result that concentrations of $PM_{2.5}$ are falling relatively slowly, with a forecast decrease of just 0.02 µg m^{-3} at background locations near Bristol Airport between 2027 and 2030, according to Defra's background maps. This implies that the impact from the Proposed Development on $PM_{2.5}$ concentrations will be very similar, regardless of whether 12 mppa is reached in 2030, 2027 or 2034.

7.7.70 For other pollutants, namely PM_{10}, nutrient nitrogen deposition and acid deposition, it is likely that an earlier assessment year would produce very slightly higher impacts than a later assessment year, but the quantitative assessment for 2030 shows that impacts are sufficiently small that an Assessment Year of 2027 (Faster Growth Case) would not materially change the conclusion that

there are no significant effects. The original ES may be considered a worst case for these pollutants, and found no significant effects for any of these pollutants.

Summary

7.7.71 A qualitative assessment of the Faster Growth Case and Slower Growth Case, informed by the quantitative assessment for the 2030 Core Case and by the original ES, suggests that the impacts of the Proposed Development will not be materially different from the 2030 Core Case, and there will be **no significant effects** for any of the Growth Cases considered.

7.8 Summary of predicted effects and their significance

7.8.1 A summary of the results of the supplementary assessment of air quality operational effects is provided in **Table 7.9.**

Table 7.9 Summary of significance of effects

Receptor and summary of predicted effects	Significance	Summary rationale
Human health effects: Annual mean NO_2	Not significant	There are no moderate or substantial impacts, in terms of the IAQM/EPUK guidance, at any of the modelled receptors. There are slight adverse impacts at fourteen receptors. There are no new or existing exceedances of the limit value. Annual mean NO_2 concentrations are less than 75% of the AQAL at all modelled receptors.
Human health effects: Hourly mean NO_2	Not significant	Given that the annual mean NO_2 concentrations are well below the 60 µg m^{-3} value suggested by Defra as indicating that exceedances of the hourly mean limit are likely to occur, it is not considered credible that there is any risk of any exceedance of the hourly mean NO_2 AQAL.
Human health effects: Annual mean PM_{10}	Not significant	Annual mean PM_{10} concentrations are well below the AQAL and the impact of the Proposed Development is negligible at all receptors under the IAQM/EPUK criteria. This impact is therefore not considered significant.
Human health effects: Daily mean PM_{10}	Not significant	The daily mean PM_{10} is estimated to be greater than 50 µg m^{-3} on no more than three days per year at any of the receptors. The AQAL specifies that there should be no more than 35 days per year greater than 50 µg m^{-3}, so it is not considered that there is any risk of any exceedance of the daily mean PM_{10} AQAL.
Human health effects: Annual mean $PM_{2.5}$	Not significant	Annual mean $PM_{2.5}$ concentrations are well below the AQAL and the impact of the Proposed Development is negligible at all receptors under the IAQM/EPUK criteria. Concentrations are below the WHO guideline at all but two receptors This impact is therefore not considered significant.
Ecological effects: Annual mean NO_x	Not significant	Some parts of Felton Common exceed the AQAL, largely due to the existing background. However, under EA criteria, the impacts at this site can be considered not significant. At all other ecological sites, the PEC is well below the AQAL and again the impacts can be considered not significant under EA criteria.
Ecological effects: Daily mean NO_x	Not significant	At all ecological sites, the PEC is well below the AQAL and under EA criteria the impacts can be considered not significant.

Receptor and summary of predicted effects	Significance	Summary rationale
Ecological effects: Nutrient nitrogen deposition	Not significant	All ecological sites modelled exceed the critical load for nutrient nitrogen deposition, due to existing background. However, the additional contribution from the Proposed Development is small, and under EA criteria, the impacts at all ecological sites can be considered not significant.
Ecological effects: Acid deposition	Not significant	Two ecological receptors are modelled to exceed the critical load for acid deposition, due to existing background. However, the additional contribution from the Proposed Development is small, and under EA criteria, the impacts at all ecological sites can be considered not significant.

7.8.2 These predicted effects are based on the quantitative assessment for the 2030 Core Case, but the conclusions are considered to be robust against the 2027 Faster Growth Case and 2034 Slower Growth Case.

7.9 Additional Mitigation

7.9.1 No requirement for additional mitigation has been identified as a result of this assessment.

7.10 Conclusions of significance evaluation

7.10.1 Overall, the air quality impacts of the Proposed Development are considered to be **not significant**. Increases in annual mean NO_2 result in impacts which are classified as slight adverse in terms of the IAQM/EPUK guidance at fourteen receptors, but there are no significant air quality impacts at any human or ecological receptor.

7.10.2 This conclusion is therefore different from the air quality assessment for the original ES, which identified that the air quality impacts were considered to be of moderate adverse significance. The principal reason for the change is that the present assessment uses the most up-to-date emission factors for road vehicles, which (for NO_x) are less pessimistic than those used in the original ES assessment. This means the present assessment forecasts lower NO_2 concentrations at roadside receptors. The later Assessment Year also reduces the impacts from the Proposed Development.

7.10.3 This conclusion is based on the quantitative assessment for the year 2030, but the conclusions are considered to be robust against the 2027 Faster Growth Case and 2034 Slower Growth Case.

8. Socio-economics

8.1 Introduction

8.1.1 This chapter of the ES Addendum supplements **Chapter 15: Socio-economics** of the original ES (December 2018) ('original ES') and should be read in conjunction with it. The original ES carried out an assessment of the socio-economic impacts of the Proposed Development based on the best information available at the time. The original ES concluded:

"The economic boost associated with Bristol Airport's future expansion to both the North Somerset and West of England[50] economy, benefitting employees (from increased job opportunities) and employers (from opportunities for business growth), is considered to be positive but negligible and not significant at construction stage. Once operational the effects in terms of employment and GVA benefits to North Somerset and to the West of England are considered to be positive and major (significant). To the wider South West England and Wales economy the effects are considered to be positive and moderate. "

8.1.2 Effects assessed within the Original ES chapter were: direct, indirect and induced and "catalytic" economic effects (on jobs and Gross Value Added (GVA)) arising from both Bristol Airport users and employees. Effects on the labour market were also examined, as were: demographic impacts; impacts on housing; and impacts on other local services.

8.1.3 In summary, this chapter of the ES addendum takes updated and more detailed information into account covering:

- Updated passenger forecasts;
- Change in Assessment Year from 2026 to 2030 (the year in which 12 mppa will be reached) - 2030 is the Core Case assessed within this chapter;
- A Faster Growth Case (where 12 mppa is reached in 2027) and a Slower Growth Case (where 12 mppa is reached in 2034) in comparison to the Core Case; and
- New survey and forecast data reflecting passenger behaviour and preferences, tourism and visitor expenditure, and productivity.

8.1.4 The quantitative assessment uses the Core Case of 2030 as the Assessment Year. Consideration has also been given to the range of uncertainty in the opening year (when 12 mppa is reached), and qualitative assessments of the Faster and Slower Growth Cases (Assessment Years of 2027 and 2034) have also been carried out and are reported in **paragraph 8.17 onwards**.

8.1.5 The original ES used data from an Economic Impact Assessment prepared in 2018[51] ('YAL 2018 Assessment'). A later Addendum[52] ('YAL Addendum') to the YAL 2018 Assessment is now available

[50] The geographic area of the West of England used in the assessment is a composite sub-region made up of the four local authority districts of North Somerset, City of Bristol, Bath and North East Somerset and South Gloucestershire.

[51] York Aviation (2018). Development of Bristol Airport to accommodate 12 million passengers per annum: Economic Impact Assessment, Draft Report November 2018.

[52] York Aviation (October 2020). Development of Bristol Airport to accommodate 12 million passengers per annum: Economic Impact Assessment Addendum

(November 2020) and provides relevant information for updating the original ES. Both reports follow the same analytical framework and approach to economic modelling.

8.1.6 The YAL Addendum is the main source for the supplementary information presented in this chapter. The methodological approach used in the YAL Addendum is the same as that used in the YAL 2018 Assessment with the refinement of a quantitative estimate of the preference of passenger demand for other airports in the region. Updates have been made to inputs and underlying assumptions to reflect both changed circumstances and updated Government and Bristol Airport forecasts. However, the YAL Addendum states that the fundamental conclusions from the analysis presented in the YAL 2018 Assessment have not changed.

8.1.7 The YAL Addendum adds further detail on outbound tourism, the airport's role in supporting foreign direct investment (FDI), the quality of jobs at the airport, the availability of labour, and new evidence in terms of the airport's social value. While the information on jobs and labour provides further evidence on the local labour market, it does not change the overall judgement or conclusions on significance. This further information is drawn upon where appropriate in this ES Addendum.

8.2 Relevant legislation, planning policy and technical guidance

8.2.1 The majority of the legislation, planning policy and technical guidance provided in section 9.2 of the original ES remains up to date with the following exceptions to policy.

National Planning Policy Framework (NPPF)

8.2.2 Although the NPPF[53] has been revised following submission of the original ES, the principal policy concerning socio-economics has not changed.

West of England Local Industrial Strategy

8.2.3 The West of England Local Industrial Strategy was published in July 2019[54]. The Strategy sets out the ambitions for partners in the West of England sub-region to deliver greater economic growth focusing on cross-sector innovation, inclusive growth, addressing productivity and innovative infrastructure delivery. The Strategy recognises the role of Bristol Airport in providing strong international connectivity.

8.3 Scope of the Assessment

8.3.1 The scope of the revised socio-economic assessment presented here reflects updates to UK Government forecasts of GVA for the economy and unemployment local to the airport and updates to forecasts of operational GVA and employment estimates as reported in the YAL Addendum. The YAL updates primarily relate to passenger preferences and the growth rate of demand, particularly the points in time when demand at the airport reaches 10 mppa and 12 mppa following recovery from the COVID-19 pandemic. The YAL Addendum reflects:

- ***Updated Traffic Forecasts*** – these are based on the updated passenger demand forecasts. They reflect passenger growth taking account of the COVID-19 pandemic and longer term

[53] Ministry of Housing, Communities and Local Government (2019) National Planning Policy Framework

[54] HM Government (2019) West of England Local Industrial Strategy

factors in the latest economic forecasts available for the UK and world economies, such as BREXIT. In the Core Case, the airport is now expected to reach 12 mppa in 2030;

- ***CAA Passenger Survey 2019*** - the CAA Departing Passenger Survey is performed annually for a selection of UK airports and Bristol Airport was included in the 2015 and 2019 surveys. The recent 2019 information directly affects the representation of wider economic impacts.
- ***Tourism Visits and Expenditure Data*** – updated information on tourism expenditure and visits from VisitBritain is included in the estimates; and
- ***Updated Productivity Assumptions*** – the latest Government estimates of future productivity assumptions have been included, as reported in the Annual Business Survey and Business Register and Employment Survey from the Office for National Statistics (ONS).

8.3.2 The YAL Addendum also provides a supplementary quantitative estimate of the potential for product displacement impacts from passengers' use of airports other than Bristol Airport. There are no product displacement impacts estimated in North Somerset and the West of England because the alternative airports[55] are located in the wider South West and South Wales region.

8.3.3 In the South West and South Wales region, product displacement effects are included in the comparison of the baseline and the Core Case ('With Development'). In the baseline, because of the 10mppa capacity constraint, 72% of the growth in passenger demand that would have occurred if 12 mppa was consented at Bristol Airport is estimated to be displaced to airports outside the region (such as Heathrow), or chooses not to fly. 28% is estimated to be displaced to airports in the region. In the Core Case, not all of the demand is displaced and some remains at Bristol Airport providing regional economic GVA and employment benefits of £310m annually (See **Table 8.9**). The Core Case is therefore based on retaining 72% of the passenger demand at Bristol Airport which is considered a conservative (lower) estimate[56].

8.3.4 There are no updates to the assessment of construction impacts and these, although assigned to occur three years later than in the original ES, have the same numerical values as before because they are expressed in constant 2018 prices and so do not need adjustment for inflation. The annual GVA and employment impacts are greatest in 2023 and 2029. The total number of job years contributed by the construction programme is 285 in North Somerset, 775 in the West of England, and 1335 for the South West and South Wales region. The discounted value of the GVA benefits across the whole construction period for the same geographic areas is £28m, £40m, and £57m respectively.

8.3.5 The scale of construction works have not changed and conclusions on the significance of construction impacts have similarly not changed; they continue to be estimated to be positive but of low magnitude and so **not significant**.

8.3.6 The specification of receptors remains unchanged and no new types of potential impacts are scoped into the assessment.

8.3.7 The assessment considers the future situation where the passenger demand level of 12 mppa is reached in 2030 as the Core Case ('With Development'). This is compared to a future baseline where passenger demand in 2030 is 10 mppa ('Without Development'). A sensitivity test has been undertaken for the Faster (2027) and Slower (2034) Growth Cases which is reported in **paragraph 8.17 onwards**.

[55] Cardiff, Exeter, Newquay and Bournemouth airports.

[56] See footnote 3

8.4 Overall Baseline

Baseline in 2018

8.4.1 The estimated impact of Bristol Airport remains unchanged since the original ES was prepared and is shown in **Tables 8.2** and **8.3**. The "total economic footprint" is the sum of direct, indirect and induced effects. Wider impacts are the sum of productivity and tourism effects. The grand total is the sum of both total economic footprint and wider impacts.

Table 8.1 The baseline economic impact of Bristol Airport in 2018 in North Somerset

	Total estimated effects in 2018		
	GVA (£m)	**Jobs**	**FTEs**
Direct	£200	1,300	1,150
Indirect & Induced	£60	1,100	875
Total economic footprint	***£260***	***2,400***	***2,025***
Productivity	£90	600	450
Tourism	£5	75	50
Wider Impacts (Total)	***£95***	***675***	***500***
Grand Total	**£355**	**3,075**	**2,525**

Source: York Aviation[23]

Table 8.2 Bristol Airport economic impact in the West of England and South West England and South Wales (2018, Baseline)

	West of England			South West & South Wales		
	GVA (£m)	**Jobs**	**FTEs**	**GVA (£m)**	**Jobs**	**FTEs**
Direct	£260	2,900	2,550	£300	3,900	3,425
Indirect & Induced	£170	2,900	2,350	£310	6,050	4,775
Total economic footprint	*£430*	*5,800*	*4,900*	*£610*	*9,950*	*8,200*
Productivity	£290	2,250	1,850	£780	8,400	6,625
Inbound tourism	£90	1,475	1,200	£260	5,125	4,050
Wider Impacts (Total)	*£380*	*3,725*	*3,050*	*£1,040*	*13,525*	*10,675*
Grand Total	£810	9,525	7,950	£1,650	23,475	18,875

Source: York Aviation(2018)[23]. Note that "total economic footprint" is the sum of direct, indirect and induced. Wider impacts are the sum of productivity and tourism effects. Grand total is the sum of both economic footprint and wider impacts. Note these are not additive; South West England and South Wales includes effects in The West of England for example.

Future Baseline

8.4.2 The future baseline is a projection of the impacts of the airport in 2030 under the conditions where capacity continues to be constrained to 10 mppa, although passenger demand is forecast to exceed this level.

8.4.3 There have been no revisions by UK Government to its published projections for population based on 2018 estimates and used in the original ES. Population growth in North Somerset is forecast to be 2.5% in total from 2026 to 2030, exceeding the 1.5% forecast for England over the same period, but the general level of population growth is low and justifies the simple arithmetic calculation of differences between 2026 and 2030 despite the change in population over the period.[57] Population growth for the South West is forecast at an average of 0.7% a year between 2026 (as used in the original ES) and 2030 (as used here) which is an aggregate 2.2% increase[4].

8.4.4 Since the original ES, historical GVA figures used as the basis for assessing significance are now published by UK Government using a very similar but more accurate methodology[58]. The use of the latest revision results in small changes in the estimated sizes of the economy at all geographic scales. These figures are now published, adjusted for inflation (in real terms using constant 2018 prices) and the comparisons between the impact of the airport and the size of the economy have been revised also to be in real terms. The effect of these changes is that the impact of the airport in percentage terms in both the baseline and 'With Development' is slightly greater than reported in the original ES. The differences between them are very slightly greater.

8.4.5 The labour market has seen a significant rise in unemployment since June 2018 and the latest levels (October 2020) are reflected in comparisons below with the jobs provided at the airport. The airport remains a major employer in the area providing work for the increasing number of jobseekers entering the local labour market.

8.4.6 The total estimated effects under the projected future baseline for the airport operating at a capacity of 10 mppa in 2030 is shown in **Tables 8.3 and 8.4** for North Somerset and the West of England respectively. The three left-hand columns show the contribution of the airport in terms of total GVA, total jobs (full and part-time) and total jobs alternatively expressed in full time equivalent (FTE) values. The three right-hand columns show the differences from the estimates for 2026 in the original ES, with negative values meaning that the updated estimates used here are lower than in the original ES.

Table 8.3 Bristol Airport projected future baseline economic impact in North Somerset (2030 – 10 mppa) and differences from estimates in the original ES

	Total estimated effects in 2030 – 10mppa			**Differences from estimates for 2026 (10mppa) reported in the original ES**		
	GVA (£m)	**Jobs**	**FTEs**	**GVA (£m)**	**Jobs**	**FTEs**
Direct	£240	1,360	1,200	£0	-90	-75
Indirect & Induced	£70	1,160	910	£0	-40	-40
Total economic footprint	***£310***	***2,520***	***2,110***	***£0***	***-130***	***-115***

[57] Office for National Statistics (2017). 2018-based subnational principal population projections for local authorities and higher administrative areas in England (Table 2) [online]. Available at: https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationprojections/datasets/localauthoritiesinenglandtable2 [Checked 9/11/20].

Productivity	£100	580	460	-£10	-70	-65
Tourism	£10	180	140	£5	80	65
Wider Impacts (Total)	***£110***	***760***	***600***	***-£5***	***10***	***0***
Grand Total	**£420**	**3,280**	**2,710**	**-£5**	**-120**	**-115**

Source: York Aviation[23]

Table 8.4 Bristol Airport projected future baseline economic impact in West of England (2030 – 10 mppa) and differences from estimates in the Original ES

	Total estimated effects in 2030 – 10mppa			**Differences from estimates for 2026 (10mppa) reported in the Original ES**		
	GVA (£m)	**Jobs**	**FTEs**	**GVA (£m)**	**Jobs**	**FTEs**
Direct	£310	3,020	2,650	£0	-205	-175
Indirect & Induced	£200	3,060	2,490	£0	-115	-85
Total economic footprint	***£510***	***6,080***	***5,140***	***£0***	***-320***	***-260***
Productivity	£420	2850	2320	£60	350	270
Tourism	£110	2200	1790	£10	550	465
Wider Impacts (Total)	***£530***	***5050***	***4110***	***£70***	***900***	***735***
Grand Total	**£1,040**	**11,130**	**9,250**	**£70**	**580**	**475**

8.4.7 The total estimated effects under the projected future baseline for the airport operating at a capacity of 10 mppa in 2030 are shown in **Table 8.5** for the South West and South Wales region. The product displacement effects of passengers choosing an alternative airport are quantified at a regional level and included in the total estimates shown in the three left hand columns. The values in the three right hand columns reflect the combined differences from the inclusion of regional product displacement effects and from the changes from the other causes also leading to differences presented in the tables above for the other geographic scales.

Table 8.5 Bristol Airport projected future baseline economic impact in the South West and South Wales (2030 – 10 mppa) and differences from estimates in the Original ES

	Total estimated effects in 2030 – 10mppa			**Differences from estimates for 2026 (10mppa) reported in the Original ES**		
	GVA (£m)	**Jobs**	**FTEs**	**GVA (£m)**	**Jobs**	**FTEs**
Direct	£380	4,310	3,780	**£20**	**-40**	**-45**
Indirect & Induced	£380	6,740	5,330	£10	140	105
Total economic footprint	***£760***	***11,050***	***9,110***	***£30***	***100***	***60***
Productivity	£980	9,400	7,430	£30	75	55
Tourism	£290	5,830	4,610	-£30	130	110
Wider Impacts (Total)	***£1,270***	***15,230***	***12,040***	***£0***	***205***	***165***
Grand Total	**£2,030**	**26,280**	**21,150**	**£30**	**305**	**225**

Source: York Aviation[23]

8.4.8 The changes in the projected future baseline shown in **Tables 8.4, 8.5 and 8.6** result from the net effects of updates to forecasts detailed in the YAL Addendum and the inclusion of quantified estimates for product displacement in the wider region. The principal decreases are in the most proximate geographic area (North Somerset) and the widest (the South West and Wales) while the intermediate area (West of England) experiences a general increase.

8.5 Embedded Mitigation

8.5.1 The original ES confirmed that BAL had committed to prepare a Skills and Employment Plan (SEP). The SEP will include targeted engagement programmes for each phase of the Proposed Development focusing on the reduction of in-work poverty and deprivation as well as educational opportunities for young people (from primary through to university level) and those marginalised from the workforce. As part of SEP commitments to the operational phase, BAL has agreed with NSC officers to make a financial contribution to enable delivery of the 'Achieve Programme', an employment fund for the people of North Somerset (with a focus on Weston-super-Mare and South Bristol), as detailed in the draft Section 106 Agreement. The SEP also includes a monitoring programme with agreed performance indicators.

8.6 Assessment of Operational Effects

8.6.1 The economic impacts discussed below reflect consideration of the Core Case in which passenger demand is forecast to reach 12 mppa in 2030 and there is a corresponding capacity increase from 10 mppa to 12mppa. Both *total* effects from the Proposed Development and *additional* effects from the 2 mppa increase over the future baseline based on 10 mppa are shown in the tables in this section.

Effects on employees, employers and airport users - North Somerset

8.6.2 By 2030, the total direct annual economic effect of Bristol Airport at 12 mppa in North Somerset is estimated to rise from £240 million GVA per year to £280 million GVA per year (as expressed in constant 2018 prices). This is a direct increase of £40 million per annum to the economy of North Somerset over the 10 mppa future baseline (See **Table 8.6**). Total direct employment will reach 1,640 jobs (equivalent to 1,440 FTE jobs). Indirectly, again in North Somerset alone, a further £80 million GVA and almost double the direct jobs (1,410 jobs) will be supported indirectly, arising from local employee spending and local business supply chains. This constitutes an increase of £10 million GVA and 250 jobs over the projected 10 mppa impact. In addition, a total of £130 million GVA is estimated to be supported via wider effects from enhanced productivity as well as tourism; this produces an increase of £20 million to the local economy alongside 180 new jobs.

Table 8.6 Bristol Airport total and additional economic impact in North Somerset (2030 – 12 mppa)

	Total estimated effects – 12mppa			**Additional effect – increase from 10 to 12mppa**		
	GVA (£m)	**Jobs**	**FTEs**	**GVA (£m)**	**Jobs**	**FTEs**
Direct	**£280**	**1,640**	**1,440**	**£40**	**280**	**240**
Indirect & Induced	£80	1,410	1,100	£10	250	190
Total economic footprint	***£360***	***3,050***	***2,540***	***£50***	***530***	***430***
Productivity	£120	710	560	£20	130	100

	Total estimated effects – 12mppa			Additional effect – increase from 10 to 12mppa		
	GVA (£m)	Jobs	FTEs	GVA (£m)	Jobs	FTEs
Tourism	£10	230	180	£0	50	40
Wider Impacts (Total)	***£130***	***940***	***740***	***£20***	***180***	***140***
Grand Total	**£490**	**3,990**	**3,280**	**£70**	**710**	**570**

8.6.3 Overall, taking all these channels of effect into account, Bristol Airport is estimated to contribute close to half a billion (£490 million) GVA per annum and 3,990 jobs to the economy of North Somerset at 12 mppa in 2030. This constitutes an increase of £70 million GVA per year and 710 additional jobs (570 FTEs) over the future baseline of 10 mppa in 2030.

8.6.4 In terms of the magnitude of change, the total GVA effect of the airport operating at 12 mppa is equivalent to 11% of the North Somerset economy (as of 2018). The additional economic impact provided by the Proposed Development would be equivalent to 2% (again as of 2018). However, the local economy can be expected to continue to grow between 2018 and 2030. Part of this growth is expected to be driven by Bristol Airport itself.

8.6.5 The potential size of the economy in 2030 has been estimated to enable comparisons. Any economic forecasts are subject to error as economies respond to a range of internal and external factors. Bespoke local economic forecasts are commercially available but are typically not in the public domain. In the absence of bespoke economic forecasts, past rates of annual growth from the eleven year period up to 2018 have been identified.[58] Assuming these rates, on average, continue for the period 2019 to 2030, they provide estimates which give an approximate idea of scale. While the historical trend includes the potentially analogous 2008/09 recession, these estimates do not explicitly represent the reduced growth in the local economy anticipated from COVID-19 and BREXIT. The relative effects of the airport expressed as a percentage of the local economy are therefore lower and more conservative than if COVID-19 and BREXIT had been included because although airport demand is lower, the economy would also be expected to be smaller. For North Somerset, the historical trend in the average rate of GVA growth, without an adjustment for the reduction in growth expected due to COVID-19 and BREXIT, is 1.8% per year above inflation.[59] If this were to continue, the GVA in the local North Somerset economy, expressed in constant 2018 prices, will have increased from some £4.6 billion in 2018 to some £5.7 billion in 2030.

8.6.6 The total GVA effects from Bristol Airport – in North Somerset - would then constitute approximately 8.6% of the North Somerset economy in 2030 based on historical trends and a probably larger proportion once the expected impacts of COVID-19 and BREXIT take effect. Of this 8.6%, the additional economic stimulus provided by the Proposed Development would amount to 1.2%. Whilst the percentage change is small, from a single facility this is a significant contribution. In terms of magnitude, for comparison between 2008 and 2009, during which the UK was in a significant recession, total GVA in North Somerset decreased by 4.4%. Overall, the GVA effect of the Proposed Development is judged a positive effect and the magnitude of change is considered to be **high**. This conclusion is the same as that reached in the original ES.

[58] Office for National Statistics (2019). Regional gross domestic product (GDP) reference tables [online]. Available at: https://www.ons.gov.uk/economy/grossdomesticproductgdp/bulletins/regionaleconomicactivitybygrossdomesticproductuk/1998to2018/relateddata [Checked 19/11/20].

[59] Based on GVA growth from between 2007/2008 to 2017/2018 in North Somerset District. This ranged from 7.1% in 2012/2013 to -4.4% in 2008/2009. The average annual GVA growth over this eleven-year period was 1.8%. This assumed growth rate was then applied to the 2018 value of GVA in North Somerset for each of the eleven years between 2019 and 2030. This resulted in estimated GVA in 2030 of £7.8 billion

8.6.7 The sensitivity of the receptors in North Somerset need to be considered in the context of the importance of local economic growth. In the baseline above, North Somerset's economic characteristics are compared with those of wider areas using standard data in order to establish the local and wider aggregated effects. Overall, both GVA and employment growth has been generally good in recent years, despite the 2008/09 recession, with relatively broad-based employment by sector. The population is slightly older than the surrounding area, but health is good and economic activity rates reasonably high. There are small pockets of relative deprivation and, although this is less than in surrounding areas, both average earnings and GVA per head in North Somerset are low in comparison to other parts of the West of England and nationally. Claimant unemployment has been comparatively low, but in recent years has started to increase. In terms of labour supply, the number of additional jobs created by the Proposed Development equates to just over a third (36%) of the claimant unemployed registered in North Somerset in June 2018 and 13% of the claimant unemployed as at October 2020, reflecting the effects of COVID-19 on the labour market[60]. On balance, the sensitivity of the receptors is considered to be **medium**. This conclusion is the same as in the original ES.

8.6.8 Overall, based on assessment of magnitude and sensitivity, the estimated economic impacts of the Proposed Development on the local North Somerset economy arising from the benefits to employees from increased job opportunities, to employers from opportunities for business growth and the increase in the range of destinations, is considered to be **positive and major (significant)**. This conclusion is the same as in the original ES.

Effects on employees, employers and airport users – West of England

8.6.9 **Table 8.7** provides estimates of the economic effects of the Proposed Development for the West of England. The total economic impact of Bristol Airport at 12 mppa is projected to reach £1,260 million annually in terms of GVA, with 13,590 jobs arising. In terms of the impact associated with the Proposed Development, there is an additional impact of £220 million GVA per annum and an additional 2,460 jobs (2,040 FTEs) when compared to the future baseline (10 mppa at 2030). The total economic impact of the airport in GVA terms is equivalent to 3.3% of the total GVA in the West of England economy as of 2018 (£35.3 billion) with the additional economic impact associated with the Proposed Development equivalent to 0.6%. The West of England economy can be expected to continue to grow between 2018 up to 2030, and again, part of this is expected to be driven by Bristol Airport itself.

Table 8.7 Bristol Airport total and additional economic impact in the West of England (2030 – 12 mppa)

	Total estimated effects – 12mppa			Additional effect – increase from 10 to 12mppa		
	GVA (£m)	**Jobs**	**FTEs**	**GVA (£m)**	**Jobs**	**FTEs**
Direct	£370	3,620	3,180	£60	600	530
Indirect & Induced	£240	3,680	3,000	£40	620	510
Total economic footprint	***£610***	***7,300***	***6,180***	***£100***	***1,220***	***1,040***
Productivity	£510	3,470	2,820	£90	620	500

[60] (Office for National Statistics (2020). CC01 Regional labour market: Claimant Count by unitary and local authority. Available at: https://www.ons.gov.uk/employmentandlabourmarket/peoplenotinwork/unemployment#publications.

Claimant unemployed in North Somerset in October 2020 was 5,655, an increase from 1,995 in June 2018. In the West of England, the figures for the same years are 37,400 and 10,675 respectively.

Tourism	£140	2,820	2,290	£30	620	500
Wider Impacts (Total)	***£650***	***6,290***	***5,110***	***£120***	***1240***	***1000***
Grand Total	**£1,260**	**13,590**	**11,290**	**£220**	**2,460**	**2,040**

Source: York Aviation[23]

8.6.10 The forecast size of the economy in 2030 in the West of England is estimated here based on historic average annual growth rates to enable comparison. Application of the same method as described for North Somerset above leads to an estimated average GVA growth rate of 1.6% per year above inflation.[61] If this were to continue, the GVA in the West of England economy would have increased from some £35.3 billion in 2018 to almost £43 billion in 2030. At this point, the total economic effect of the airport across the West of England would constitute 2.9% of the West of England economy and the estimated increase between 10 mppa and 12 mppa would equate to an additional 0.5% (included in the 1.9%). For comparison, the same dataset suggests economic slowdown across the whole West of England between 2008 and 2009 was -1.8% of GVA. Overall, the operational effects of the Proposed Development are positive and the magnitude of change is considered to be **high**. This conclusion is the same as in the original ES.

8.6.11 The baseline reports economic characteristics for the West of England using standard data and, although it shows expected diversity in characteristics reflecting a larger area, overall employment growth has been mixed in recent years with strong growth in Bristol but net losses in South Gloucestershire. The age profile is mixed, with a younger profile in the cities of Bristol and Bath. There are significant pockets of deprivation across the West of England, with concentrations in South Bristol (home to a large proportion of current Bristol Airport employees), Weston-Super-Mare, East Bristol and parts of West Bath. Average earnings and GVA per head in the four districts which comprise the West of England are mixed, with high rates in Bristol and South Gloucestershire but lower elsewhere. Claimant unemployment has been persistently high in Bristol and has recently increased significantly across the West of England in line with national trends. In terms of labour supply, the new jobs equate to over 20% of the claimant unemployed registered in the West of England as of June 2018 and 7% of the claimant unemployed in October 2020. On balance, the sensitivity of the receptors is considered **medium**. This conclusion is the same as in the original ES.

8.6.12 Overall, based on magnitude and sensitivity, the economic boost to the West of England benefitting employees (from increased job opportunities) and employers (from opportunities for business growth) alongside an increase in the range of destinations is considered to be **positive major (significant)**. This conclusion is the same as in the original ES.

Effects on employees, employers and airport users - South West England and South Wales

8.6.13 Across the wider South West England and South Wales region, the total direct, indirect or induced and catalytic employment effects arising from Bristol Airport in 2030 with 12 mppa is estimated at £2.34 billion GVA and some 30,280 jobs (See **Table 8.8**). This amounts to an increase of £310 million to the regional economy, along with some 4,000 new jobs. Applying past rates of growth to estimate a comparator of the possible size of the economy indicates GVA for the South West and South Wales may amount to some £237 billion in 2030. At this point, the total economic effects would constitute 0.99% of the economy with the estimated increase from 10 mppa to 12 mppa amounting to 0.13%. The Core Case presents a conservative (lower) estimate in which 72% of

[61] Based on average GVA growth from between 2007/2008 to 2017/2018 in all of North Somerset District, City of Bristol, Bath and North East Somerset and South Gloucestershire. This ranged from 7.5% in 2013/2014 to -1.8% in 2008/2009. The average annual GVA growth over this eleven-year period was 1.6%. This assumed growth rate was then applied to the 2018 value of GVA in the West of England for the period 2019 to 2030. This resulted in estimated GVA in 2030 of £42.9 billion.

passenger demand that would have been displaced outside the region due to the 10 mppa constraint is retained at Bristol Airport, with the remaining 28% displaced to airports within the South West and South Wales.

8.6.14 Overall, the airport expansion results in a positive effect and the magnitude of change is considered to be **medium**. This conclusion is the same as in the original ES.

Table 8.8 Bristol Airport total and additional economic impact in South West England and South Wales (2030 – 12 mppa)

	Total estimated effects – 12mppa			Additional effect – increase from 10 to 12mppa		
	GVA (£m)	**Jobs**	**FTEs**	**GVA (£m)**	**Jobs**	**FTEs**
Direct	£430	4,900	4,300	£50	590	520
Indirect & Induced	£440	7,680	6,070	£60	940	740
Total economic footprint	***£870***	***12,580***	***10,370***	***£110***	***1,530***	***1,260***
Productivity	£1,120	10,780	8,520	£140	1380	1090
Tourism	£350	6,920	5,470	£60	1090	860
Wider Impacts (Total)	***£1,470***	***17,700***	***13,990***	***£200***	***2470***	***1950***
Grand Total	**£2,340**	**30,280**	**24,360**	**£310**	**4,000**	**3,210**

Source: York Aviation[23]

8.6.15 In terms of the sensitivity of the receptors, overall the same conclusion can be drawn for the South West England and South Wales region as for the West of England; the area is a diverse economy with areas of both prosperity and of relative deprivation. In terms of labour supply, new employment opportunities equate to 5% of the claimant unemployed registered in the area as of June 2018 and 2% of claimant unemployed in October 2020. Overall, the receptor sensitivity is considered **medium**. This conclusion is the same as in the original ES.

8.6.16 Based on magnitude and sensitivity, the economic boost to the South West and South Wales benefitting employees (from increased job opportunities), employers (from opportunities for business growth) and airport users is considered to be **positive moderate (probably significant).** This conclusion is the same as in the original ES.

Faster and Slower Growth Cases

8.6.17 In addition to the Core Case considered in the above sections, consideration has been given to the Faster (2027) and Slower (2034) Growth Cases and how they would affect the conclusions of the assessment of the 2030 12mppa Core Case presented above. In summary, neither the Faster or Slower Growth Case would change the conclusions of the Core Case.

8.6.18 Bristol Airport is already a significant employer and the difference between impacts in the Core, Faster and Slower Growth Cases in comparison to impacts in the existing and future projected baseline are relatively small at all these geographic scales. In view of this comparison, the Faster and Slower Growth Cases are considered to represent variants which do not make a material difference to the judgements or the conclusions based on the assessment of significance for the Core Case.

Summary of predicted effects and their significance

8.6.19 A summary of the results of the supplementary assessment of socio-economic operational effects is provided in **Table 8.9**. The content of the entries in this table have not changed compared to the original ES and reflect the supplementary information, in particular as provided in the YAL Addendum.

Table 8.9 Summary of significance of effects

Receptor and summary of predicted effects	Significance	Summary rationale
Employees, employers and airport users in North Somerset – Employment and GVA effects - Operational stage.	Positive effect - major (significant)	The Proposed Development is estimated to increase the size of the North Somerset economy, creating a large number of direct, indirect and catalytic jobs in a range of skill levels and occupations. In quantitative terms, this increase is judged to be **significant** to North Somerset.
Employees, employers and airport users in West of England - Employment and GVA effects - Operational stage.	Positive effect - major (significant)	The West of England is an economic driver of the South West England region. The Proposed Development is estimated to increase the size of the sub-region's economy, creating a large number of direct, indirect and catalytic jobs in a range of skill levels and occupations accessible to part of the West of England in relative need. In quantitative terms, this increase is judged to be **significant** at the West of England level.
Employees, employers and airport users in the South West and South Wales region - Employment and GVA effects - Operational stage.	Positive effect - moderate (probably significant)	The South West of England and South Wales are an economically diverse region. The Proposed Development is estimated to increase the size of the economy, creating a large number of direct, indirect and catalytic jobs in a range of skill levels and occupations accessible to part of the region in relative need. In quantitative terms, this increase is judged to be **moderate** at the regional level.

8.6.20 These predicted effects are based on the assessment for the 2030 Core Case, but the conclusions are considered to be robust against the 2027 Faster Growth Case and 2034 Slower Growth Case.

8.7 Additional Mitigation

8.7.1 No additional mitigation is required as a result of the supplementary information presented in this chapter.

8.8 Conclusions of significance evaluation

8.8.1 The original ES concluded that effects on employment and GVA benefits during the operation of the Proposed Development would be **significant beneficial**. The conclusions regarding the significance of effects reported in the original ES have not changed as a result of considering the supplementary information.

8.8.2 The principal reasons are that:

- the increases in GVA from the Proposed Development remain major in comparison to the local economy, at both proximate and wider geographic scales; and

- the increases in jobs remain major in comparison to the level of claimant unemployment for the local economy, at both proximate and wider geographic scales.

8.8.3 This conclusion is also valid for the Faster and Slower Growth Cases.

9. Human Health

9.1 Introduction

9.1.1 This chapter of the ES Addendum supplements **Chapter 16: Human Health** of the original ES (December 2018) and should be read in conjunction with this. This chapter should also be read in conjunction with ES Addendum **Chapter 5: Traffic and Transport**, **Chapter 6: Noise and Vibration**, **Chapter 7: Air Quality**, **Chapter 8: Socio-economics** and **Chapter 10: Carbon and Other Greenhouse Gases** (GHG), where there is an overlap or relationship between the assessment of effects. The original ES health chapter conclusion was (**Section 16.14**):

"Significant beneficial effects to population health are likely in relation to investment and employment due to the Proposed Development. Other effects that are likely to be beneficial, but which would not be significant in EIA terms, include the infrastructure improvements around the airport entrance that improve road safety and promote walking and cycling.

A change in significant adverse effects to population health is considered unlikely. Compared to the existing baseline and the consented increase to a 10 mppa capacity, the Proposed Development results in similar environmental exposures. Whilst there would be some localised increases in adverse effects during construction and operation for people living closest to the airport; at the population level the Proposed Development is unlikely to result in a discernible change to health outcomes."

9.1.2 This supplementary information takes account of the following:

- Updated forecast aircraft fleet mix and movement numbers (aircraft and road traffic) driven by updated passenger demand forecasts. The updated forecasts take account of the COVID-19 pandemic and longer-term factors in the UK and world economies, such as BREXIT;
- Change in Assessment Year from 2026 to 2030 (year in which 12 mppa will be reached). 2030 is the Core Case assessed within this chapter;
- A Faster Growth Case (where 12 mppa is reached in 2027) and a Slower Growth Case (where 12 mppa is reached in 2034) in comparison to the Core Case; and
- Details of the assumptions and modelling of updated forecasts, as set out in the Passenger Traffic Forecasts report[62] accompanying this ES Addendum.

9.1.3 The assessment uses the Core Case of 2030 as the Assessment Year. Sensitivity testing of the Faster Growth Case (2027) and Slower Growth Case (2034) has been undertaken on a qualitative basis and is reported in **Section 9.4.**

9.1.4 This chapter of the ES Addendum is structured to align with the original ES chapter. The following are discussed:

- Relevant legislation, planning policy and technical guidance;
- Assessment methodology;
- Operational stage: assessment of human health effects
  - Air quality

[62] York Aviation. 2020. Passenger Traffic Forecasts for Bristol Airport to Inform the proposed development to 12 mppa.

- Noise and vibration
- Travel
- Economic effects
- Community identity
- Healthcare services
- Climate change;

- Additional mitigation; and
- Conclusions of significance evaluation.

9.1.5 Sections of the original ES chapter which remain unchanged and are therefore not discussed in this ES Addendum are:

- Data gathering methodology;
- Overall baseline;
- Consultation;
- Environmental measures embedded into the development proposals; and
- Construction stage: assessment of human health effects.

9.2 Relevant legislation, planning policy, technical guidance

9.2.1 Most legislation, planning policy and technical guidance related to this assessment remains unchanged since the original ES. The following exceptions are outlined below.

Planning policy

9.2.2 The NPPF was updated in 2019[63] with relatively minor text changes from the 2018 NPPF that do not materially affect the conclusions of the original ES human health chapter.

Technical guidance

9.2.3 The WHO's Health 2020[64] overarching policy agenda has not been replaced, so emphasis moving forward is on the 2030 Agenda for Sustainable Development[65], where 'good health and wellbeing' is a sustainable development goal.

9.2.4 In October 2020, there was an update to guidance in England on health within impact assessments[66]. The focus of the new guidance by Public Health England (PHE) is on supporting local

[63] Ministry of Housing, Communities and Local Government (2019). National Planning Policy Framework, [online]. Available at: https://www.gov.uk/government/publications/national-planning-policy-framework--2 [Accessed 25 November 2020]
[64] World Health Organization Regional Office for Europe (2012). Health 2020: a European policy framework supporting action across government and society for health and well-being, [online]. Available at: http://www.euro.who.int/en/publications/abstracts/health-2020-a-european-policy-framework-supporting-action-across-government-and-society-for-health-and-well-being [Accessed 20 November 2020].
[65] United Nations. Transforming our world: the 2030 Agenda for Sustainable Development. 2015. https://sustainabledevelopment.un.org/content/documents/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf
[66] Public Health England. Guide for local authority public health and planning teams to improve the use of HIAs in spatial planning in preparation.

authorities to improve use of health impact assessment in spatial planning. The way health is to be addressed by EIA is touched upon. That guidance has been reviewed and taken into account in this ES Addendum. It is considered that the approach taken in the original ES continues to be appropriate and reflects best practice. The approach of an ES health chapter to fulfil both the statutory EIA requirements in relation to human health and the North Somerset policy requirements in relation to Health Impact Assessment (HIA) was endorsed by NSC officers during the determination of the planning application.

9.2.5 In 2018, the WHO published its Environmental Noise Guidelines for the European Region[67]. This is discussed in **Chapter 6: Noise and Vibration** of this ES Addendum. Regard has been had to the WHO guide values. However, this assessment does not hold the Proposed Development to WHO guide values where they are different to UK guidance and regulation. This is consistent with the Government's statement at paragraph 3.106 of Aviation 2050 [68].

9.2.6 These technical guidance developments have been reviewed and do not affect the conclusions of the original ES human health chapter.

Local strategies and health priorities

9.2.7 NSC's Joint Strategic Needs Assessment[69] has been reviewed. No relevant updates since the original ES have been identified.

9.2.8 NSC's 2019 isolation and loneliness strategy[70] recognises the role of the wider determinants of health in addressing isolation and loneliness. These include the benefits from education, training and employment, particularly in deprived areas. The strategy also notes the potential for noisy environments, such as communal spaces in care homes, to be a barrier to promoting social connections.

9.2.9 Bristol, North Somerset and South Gloucestershire Clinical Commissioning Group health priorities for the local population[71] have been reviewed. No relevant updates since the original ES have been identified.

9.2.10 NSC's 2020 Challenges and Issues[72] document sets out draft priorities to help shape a new Local Plan, including: "*Developing new and existing communities in a way which enhances health and wellbeing, reduces inequalities and is child and family friendly*".

9.2.11 These local strategy and priority developments do not affect the conclusions of the original ES human health chapter.

---

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/929230/HIA_in_Planning_Guide_Sept2020.pdf

67 World Health Organization Regional Office for Europe (2018). Environmental Noise Guidelines for the European Region. [Online]. Available at: https://www.euro.who.int/__data/assets/pdf_file/0008/383921/noise-guidelines-eng.pdf [Accessed 14 October 2020].

[68] HM Government (2018) *Aviation Strategy 2050: The Future of UK Aviation*. Available from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/769695/aviation-2050-web.pdf [Accessed October 2020].

[69] North Somerset Council Joint Strategic Needs Assessment, [online]. Available at: https://www.n-somerset.gov.uk/council-democracy/statistics-data/joint-strategic-needs-assessment-jsna-health-social-care [Accessed 12 November 2020].

[70] North Somerset Council. Social Isolation and Loneliness Needs Assessment and Strategy. September 2019 https://www.n-somerset.gov.uk/sites/default/files/2020-03/social%20isolation%20and%20loneliness%20strategy%20-%20September%202019.pdf

[71] Bristol, North Somerset and South Gloucestershire Clinical Commissioning Group. Health priorities for the local population, [online]. Available at: https://bnssgccg.nhs.uk/about-us/what-we-do/our-priorities/health-priorities-local-population/ [Accessed 12 November 2020].

[72] North Somerset Council (2020). Local Plan 2038: Challenges for the Future, [online]. Available at: https://www.n-somerset.gov.uk/sites/default/files/2020-07/Local%20Plan%202038%20-%20Challenges%20for%20the%20Future.pdf [Accessed 18 November 2020].

9.3 Scope of the Assessment

9.3.1 The scope of this assessment is restricted to reviewing the scope, methods, inputs and conclusions of the original ES health chapter in light of the changes set out in **paragraph 9.1.2**. As with the original ES heath chapter, this ES Addendum presents a qualitative analysis informed by the quantitative analysis in other topic areas, notably those listed in **paragraph 9.1.1**. Following a review of the scope, the assessment is restricted to operational effects.

9.3.2 The scope of the original ES health chapter assessment has been reviewed and no changes are proposed to the spatial, population or topic scope.

9.3.3 NSC's March 2020 Committee Report[73] made the following statement in relation to the original ES health chapter scope and methods: "*Chapter 16 of the ES examines the impact of the proposed development on human health and wellbeing. It is referred to as a 'Health Impact Assessment' (HIA)…. To assess the HIA, officers consulted with Public Health England (PHE) and the Council's Public Health Team. PHE are a statutory consultee for HIA's and has the expertise to advise on its acceptability. PHE's comments on the application show that it considers that the HIA has been carried out in accordance with good practice and its methodology and scope to assess the likely impacts on health and wellbeing is proportionate to the proposed development*."

9.3.4 The temporal scope of the assessment has changed from the original ES. The assessment now considers a 2030 Core Case Assessment Year, which is the year in which the 12 mppa is expected to be reached. A sensitivity test against a Faster Growth Case (2027) and a Slower Growth Case (2034) has been undertaken in the ES Addendum should the forecast growth alter from the Core Case.

9.3.5 As with the original ES, the relative change in population health under the 'With Development' compared to the 'Without Development' scenarios continues to be central to the assessment. This is the difference in 2030, between the effects experienced under the existing consented progression to 10 mppa 'Without Development', and the relative change from that scenario to the progression to 12 mppa 'With Development'.

9.4 Assessment methodology

9.4.1 The health chapter provides a qualitative assessment based on the quantitative modelling of other ES topic chapters. The health chapter methodology distinguishes between very-short, short, medium or long-term effects. Issues of exposure and frequency, which inform magnitude, also have a temporal dimension. The delay to the year at which 12 mppa is forecast to be reached and the effects from an adjusted aircraft fleet mix and ATMs do not change the way that the health chapter's methodology set out in the original ES would be applied within the assessment.

9.5 Operational stage: assessment of human health effects

9.5.1 The assessment of health effects during operation considers the determinants of health that would be negatively affected by the Proposed Development, e.g. environmental exposures; and determinants of health that would be positively affected, e.g. socio-economic effects. There is a relationship between the negative and positive effects as they have a common driver, i.e. the 12 mppa year, aircraft fleet mix and ATMs. The delay in reaching the 12 mppa year acts to both delay the negative effects and delay the positive effects. It also spreads a given effect over a longer duration. This is evident as the original ES forecasts indicated that passenger demand would reach 10 mppa by 2021 and 12 mppa by 2026, five years later. Whilst, in this ES Addendum the updated

[73] North Somerset Council. Report to the Planning and Regulatory Committee. 18 March 2020. Planning Application 18/P/5118/OUT.

Core Case forecast indicates that passenger demand will reach 10 mppa by 2024 and 12 mppa by 2030, six years later. The rate of passenger growth between baseline, 10 mppa and 12 mppa is therefore slower, reducing the rate of change in a given health effect, e.g. in both emission exposures and new employment opportunities. Within the assessment, the delay feeds into the consideration of magnitude with: (a) reduced scale or level of exposure experienced; but (b) over an increased duration. Whilst the rate of change is a relevant consideration in the judgments reached by this assessment, the focus is on comparing 'With Development' and 'Without Development' effects in the specific assessment year of 2030.

9.5.2 The updates to fleet mix and ATMs also have a relationship with each other, i.e. a trend of larger aircraft being introduced mediates (lessens) the general trend of an increasing ATMs. Fleet mix and ATMs also have a relationship with the 12 mppa year delay, i.e. greater delay increasing the strength of the trend towards more modern, larger aircraft.

9.5.3 The shift in these factors informing magnitude has been considered and it does not affect the conclusions of the health assessment contained in the original ES, i.e. the type and magnitude of effects remain the same, albeit the reasoning behind those conclusions is subtly altered.

9.5.4 Many of the operational health effect conclusions relate to the effects being characterised as 'long-term' which remains the correct characterisation with or without the delay in reaching the 12 mppa year.

9.5.5 Broadly the relationship between the 'With Development' and 'Without Development' scenarios remains the same as in the original ES, i.e. the Proposed Development would result in increased socio-economic benefits for health and similar environmental exposures that incrementally increase health risk factors, the latter are unlikely to be to a degree that would be discernible in terms of population health outcomes.

9.5.6 In summary, the original ES health chapter assessment conclusions remain valid when considered against the Core Case of 2030 rather than 2026.

9.5.7 The following sections provide additional discussion for each health topic in turn.

Air quality

9.5.8 The original ES health chapter discusses air quality effects associated with the operation of the Proposed Development from **paragraphs 16.11.1** to **16.11.11**.

9.5.9 NSC's March 2020 Committee Report[74] made the following statement in relation to the original ES health chapter assessment of operational air quality effects: "*All projected changes in concentrations of all air pollutants will … remain within statutory acceptable levels … in terms of health protection. Officers agree with this …. the health impact is contended to be 'negligible' to the wider population and 'minor adverse' to vulnerable groups.*"

9.5.10 ES Addendum **Chapter 7: Air Quality** concludes that nitrogen dioxide (NO_2) effects on human health would be lower than reported in the original ES and that conclusions for fine particulate matter (PM_{10} and $PM_{2.5}$) remain unchanged from the original ES (with some minor variations in modelled concentrations). The original ES identified moderate adverse (significant) impacts at seven receptors that are now much lower due: to emissions factors improving over time; updated data on the performance of Euro 6c cars; and improved modelling of traffic queues.

[74] See footnote 12

9.5.11 On the basis that these inputs to the ES health chapter are showing either no change or an improvement, the conclusions of the original ES health chapter are unchanged.

9.5.12 For operational air emissions, the main potential health outcomes are increased risk of cardiovascular and respiratory related conditions or events, as well as general measures of population mortality and hospital service use. Changes in concentrations of all modelled air pollutants are within statutory levels considered acceptable in terms of health protection. In the case of NO_2, the increase for a small area may contribute to a small change in health outcomes, but this change is largely due to the existing baseline conditions and would be unlikely to be a discernible change in population health. This type of health effect is relatively common in urban areas where major transport infrastructure and communities exist in close proximity. The operational air quality effects should be considered long-term, making an incremental addition to air quality related risk factors for population health.

9.5.13 The conclusion reflects the UK Government view that compliance with UK Air Quality Objectives demonstrates an acceptable level of health protection[75] and that these air quality protection measures are produced in the knowledge that particular groups within a population will have particular health vulnerabilities. The minor adverse (rather than negligible) score for vulnerable groups represents a conservative assessment on the basis of scientific uncertainty (and emerging evidence) about non-threshold health effects of NO_2 and $PM_{2.5}$. This is a public health acknowledgement of the incremental contribution to air pollution that the Proposed Development would make, but also recognition that, at the project level, this should not be considered a significant effect on population health.

9.5.14 The original ES health chapter assessment conclusions remain valid. The original ES health chapter conclusion was that the effect would be **negligible** for the general population and up to **minor adverse** (**not significant**) for vulnerable groups.

Noise and vibration

9.5.15 The original ES health chapter discusses noise effects associated with the operation of the Proposed Development from **paragraphs 16.11.12** to **16.11.22**.

9.5.16 NSC's March 2020 Committee Report[76] made the following statement in relation to the original ES health chapter assessment of operational noise effects: "*The HIA indicates… the significance of the effect would be negligible for the general population and up to minor adverse (not significant) for vulnerable groups. The small increase in exposure for much of the local population is unlikely to result in a significant population health effect, but this affect is no more than 'minor adverse'. Officers' assisted by PHE comments agree with this assessment.*"

9.5.17 The noise assessment presented in **Chapter 6: Noise and Vibration** of this ES Addendum identifies similar or lower impacts when compared to the original ES. The original ES finding of no significant adverse effects is unchanged. The mitigation offered as part of the original ES is still considered appropriate. The health analysis continues to refer to:

- the level above which adverse effects on health and quality of life can be detected (LOAEL); and
- the level above which significant adverse effects on health and quality of life occur (SOEAL).

[75] Department for Environment Food & Rural Affairs. UK and EU Air Quality Limits, [online]. Available at: https://uk-air.defra.gov.uk/airpollution/uk-eu-limits [Accessed 16 November 2020].
[76] See footnote 12

9.5.18 The changes in ATMs (including due to fewer larger aircraft) informing the **Chapter 6: Noise and Vibration** analysis can be seen by comparing the original ES noise chapter **Table 7.1** to ES Addendum noise chapter **Table 6.1**.

9.5.19 For noise, the main potential health outcomes are cardiovascular health, mental health conditions (e.g. stress, anxiety or depression), sleep disturbance and cognitive performance in children. The Proposed Development results in a larger population being adversely affected by noise, mainly due to increased night-time noise from airborne aircraft. In the context of existing levels of daytime and night-time noise (due to existing noise issues and the permitted changes that would occur without the Proposed Development), the changes due to the Proposed Development are small. In population health terms, the change due to the Proposed Development is unlikely to be discernible. The operational noise effects should be considered long-term, making an incremental addition to population risk factors for sleep disturbance, cardiovascular outcomes and learning outcomes.

9.5.20 The greatest potential for population level changes to health, in terms of noise effects of sufficient extent and severity, continue to relate to the night-time air noise SOAEL. A minor adverse effect continues to be considered appropriate to reflect that a small minority of the local population would be affected. This score also acknowledges that not all people would take up the noise insulation scheme as it is voluntary.

9.5.21 In relation to noise for those affected at the LOAEL (particularly at night), the incremental effect to a larger number of people is in population health terms not negligible; but equally, given the very small change (likely barely perceptible) and the many other sources contributing to the local soundscape, it continues to be considered a not significant project level effect.

9.5.22 The original ES health chapter identified key metrics from the noise analysis to illustrate the population health issues. The following points show how those metrics have changed. The discussion compares original ES noise chapter **Table 7.33** (which summarised **Table 7D.24**) to ES Addendum noise chapter **Table 6A.15**. The metrics consider air noise dwelling counts, $L_{Aeq,8h}$ for an average mode summer night. For this measure, the ES Addendum compares the 12 mppa 2030 'With Development' and the 10 mppa 2030 'Without Development' scenarios. The original ES compared the 12 mppa 2026 'With Development' and the 10 mppa 2026 'Without Development' scenarios.

- For the LOAEL (45 $L_{Aeq,8h}$ contour) there is a reduction (improvement) of 300 dwellings. This is a reduction from '900 more' dwellings at the LOAEL in the original ES (comparing the 'With Development and 'Without Development' scenarios in 2026) to '600 more' dwellings in the ES Addendum on the same measure for 2030.
- By contrast for SOAEL (55 $L_{Aeq,8h}$ contour) there is an increase of 50 dwellings. This is an increase from '100 more' dwellings at the SOAEL in the original ES (comparing the 'With Development' and 'Without Development' scenarios in 2026) to '150 more' dwellings in the ES Addendum on the same measure for 2030. Although a relative increase, this is in the context of reducing numbers of affected dwellings at the SOAEL in 2030 compared to 2026. Of the dwellings affected at SOAEL, the level of exposure above SOAEL is also decreased in 2030 compared to 2026 (see the 57 $L_{Aeq,8h}$ contour). Furthermore, even at the SOAEL the noise level change between the 2030 10 mppa and 12 mppa scenarios is negligible (likely barely perceptible), see **Appendix 6A: Noise and Vibration Supporting Data Table 6A.63**.

9.5.23 The overall picture for air noise is of similar or reducing numbers of dwellings being affected by elevated night-time noise levels. The same trend applies to day-time noise, see comparison between original ES noise chapter **Table 7D.21** and ES Addendum noise chapter **Table 6A.12**.

9.5.24 There is little change in ground noise (see comparison of original ES **Table 7.51** (or **7E.26**) and ES **Appendix 6A: Noise and Vibration Supporting Data** (**Table 6A.69**) or road traffic noise (see comparison of original ES Table **7E[F].10** and **Appendix 6A: Noise and Vibration Supporting Data** (**Table 6A.72**) between the 2026 and 2030 scenarios.

9.5.25 The original ES health chapter assessment conclusions remain valid. The original ES health chapter conclusion was that the effect would be **negligible** for the general population and up to **minor adverse** (**not significant**) for vulnerable groups.

Travel

9.5.26 The original ES health chapter discusses travel effects associated with the operation of the Proposed Development from **paragraphs 16.11.23** to **16.11.33**.

9.5.27 NSC's March 2020 Committee Report[77] made the following statement in relation to the original ES health chapter assessment of operational travel effects: "*The HIA concludes… permanent infrastructure improvements included in the proposed development are likely to make a modest but beneficial impact of public health outcomes … these changes would have a negligible impact on human health for the general population and up to minor beneficial for vulnerable groups. Officers agree.*"

9.5.28 The assessment presented in ES Addendum **Chapter 5: Traffic and Transport** finds that the conclusions drawn as part of the ES Addendum remain unchanged in comparison with the original ES. The updated traffic modelling finds:

- severance effects would be negligible and not significant;
- pedestrian delay and amenity effects would be minor at worst and not significant;
- operational fear and intimidation would be negligible and not significant; and
- operational driver delay would be a mixture of beneficial and adverse effects. Adverse effects are minor to moderate and not significant. Beneficial effects are moderate to major and significant.

9.5.29 The operational accidents and road safety analysis has not been updated from the original ES. It continues to be the case that the traffic and transport analysis does not anticipate a significant effect on accidents and road safety.

9.5.30 For traffic effects, the main potential health outcomes are road traffic incidents, emergency response times, journey times, physical health (e.g. cardiovascular health), mental health (e.g. stress, anxiety or depression), obesity and levels of physical activity. During operation, a number of permanent infrastructure improvements are likely to make a modest but beneficial contribution to health outcomes associated with road safety, encouraging active travel and avoiding significant adverse effects on journey times (including health-related journeys). These include: the shared pedestrian and cycle routes along sections of the A38; and junction improvements on the A38, including crossing facilities for pedestrians and cyclists. These changes would be expected to make a long-term incremental benefit to population health. This ES Addendum health chapter conclusion continues to be driven by these beneficial effects of the highway improvements associated with the Proposed Development.

9.5.31 It is noted that those accessing health services (emergency or non-emergency) may at times be affected where there are anticipated to be increases in driver delay (e.g. Junction 5 Barrow Lane arm during the AM peak hour). Ambulance services (and the recipients of their care) are particularly

[77] See footnote 12

sensitive to delays in response times (time taken to arrive and stabilise the patient). However, given the relatively small number of times and locations where travel times show a marked increase rather than decrease across the transport network in the 'With Development' scenario, the network by nature enabling alternative routes to be used and noting the priority given to ambulances travelling under blue lights, it is not anticipated that there would be a significant adverse population health effect.

9.5.32 The original ES health chapter assessment conclusions remain valid. The original ES health chapter conclusion was that the effect would be **negligible** for the general population and up to **minor beneficial** (**not significant**) for vulnerable groups.

Economic effects

9.5.33 The original ES health chapter discusses economic effects associated with the operation of the Proposed Development from **paragraphs 16.11.34** to **16.11.43**.

9.5.34 NSC's March 2020 Committee Report[78] made the following statement in relation to the original ES health chapter assessment of operational economic effects: "*The impacts are contended to be 'minor beneficial' for the general population and up to 'moderate beneficial' for vulnerable groups. While the scale of the benefits … are considered (based on an independent assessment) to be lower … they would still provide long-term good quality employment opportunities, and this is likely to have a long-term beneficial effect on population health.*"

9.5.35 The assessment in ES Addendum **Chapter 8: Socio-economics** finds that the population and economy are forecast to have underlying long-term growth and that the conclusions of the original ES are unchanged. Notably, the Gross Value Added (GVA) from the Proposed Development remains major in comparison to the local economy and the increases in jobs remain major in comparison to the level of claimant unemployment for the local economy.

9.5.36 In contrast to the spreading out of environmental emissions over a longer time period, which tends to reduce exposures and therefore lessen the adverse effect, the spreading out of economic benefits over a longer time period tends to lessen the beneficial effect. However, the economic effects of COVID-19 may increase the sensitivity of the economy to economic stimulus, investment and opportunities to increase employment in a context of higher rates of unemployment. For the health assessment, any delay in the timeframe over which operational jobs come forward is likely to be balanced (or exceeded) by the increased relative benefit of those jobs to health outcomes (including for dependants) in an economic climate of increased unemployment.

9.5.37 For employment effects, the main potential health outcomes relate to making health-promoting resources available to the employee and any dependants. This may improve living conditions and supports making healthier choices, e.g. eating a healthier diet and undertaking more physical activity. The provision of long-term good quality employment opportunities (directly at Bristol Airport, or indirectly through wider economic investment within the region facilitated by the expansion) are likely to have a long-term beneficial effect on population health locally and, to a lesser extent, regionally. Such benefits could include reducing levels of poverty and inequalities.

9.5.38 The socio-economic benefits to health from the Proposed Development's employment and investment remain likely to occur but would be realised later than the original assessment forecasted.

[78] See footnote 12

9.5.39 The original ES health chapter assessment conclusions remain valid. The original ES health chapter conclusion was that the effect would be up to **minor beneficial** for the general population and up to **moderate beneficial** (**significant**) for vulnerable groups.

Community identity

9.5.40 The original ES health chapter discusses community identity effects associated with the operation of the Proposed Development from **paragraphs 16.11.44** to **16.11.53**.

9.5.41 NSC's March 2020 Committee Report[79] made the following statement in relation to the original ES health chapter assessment of operational community identity effects: "*The HIA considers the health impacts range from 'minor adverse' to 'moderately beneficial'. Officers consider the current impact is more likely to be 'minor adverse', but it is unlikely that this will change as a result of the proposed development: during its construction or operational phase*."

9.5.42 The landscape and visual assessment of the original ES (Chapter 9: Landscape and Visual) remains unchanged (see **Table 4.1 Scope of ES Addendum**) and has accordingly not been updated in this ES Addendum. The socio-economic benefits of the Proposed Development are also unchanged as described in ES Addendum **Chapter 8: Socio-economics**.

9.5.43 On the basis that these inputs to the ES health chapter are showing no change, the conclusions of the original ES health chapter on community identity are also unchanged. The changes in community identity, although delayed, would still be likely to arise.

9.5.44 For community identity effects, the main potential health outcomes are associated with mental health conditions (e.g. stress, anxiety or depression) due to underlying social determinants influencing community cohesion. The expansion of Bristol Airport would be in the context of a population already accustomed to airport and aviation activity. For the majority of people near to Bristol Airport, the airport is already a prominent feature of the natural, cultural and economic landscape, including through views, employment and ease of access to national and international travel. The operational changes to views and the increased influence of Bristol Airport on the identity of surrounding communities should be considered long-term effects.

9.5.45 The original ES health chapter assessment conclusions remain valid. The original ES health chapter conclusion was that the effect would range from **minor adverse** (**not significant**), through to **negligible** and up to **moderate beneficial** for both the general population and vulnerable groups. The inclusion of both adverse and beneficial scores reflects that the population response would be highly subjective. Some people may focus on the economic and travel benefits of being close to an expanded airport. Other people may focus on the reduction (even though it is mitigated) in environmental amenity inherent to expansion.

Healthcare services

9.5.46 The original ES health chapter discusses healthcare service effects associated with the operation of the Proposed Development from **paragraphs 16.11.54** to **16.11.65**.

9.5.47 NSC's March 2020 Committee Report[80] made the following statement in relation to the original ES health chapter assessment of operational healthcare services effects: "*The HIA suggests that the effects of passenger growth on healthcare services could lead to a small increase in demand for GP emergency appointments by non-registered patents… the impact would be negligible for the general population and minor adverse for vulnerable groups. Officers have no evidence to disagree*."

[79] See footnote 12
[80] See footnote 12

9.5.48 The original ES **Appendix 1A paragraph 15.6.23** set out the rationale for scoping out the effects of communicable illness. That scoping decision remains valid. Whilst increased national and international travel potentially increase the spread of communicable illnesses, as with other UK airports, Bristol Airport operates appropriate surveillance systems. Surveillance would be scaled with expansion as necessary, to ensure an appropriate level of public health protection is maintained. Furthermore, the original ES health chapter noted (**paragraph 16.11.55**) that in relation to communicable illness, BAL has Port Health Incidence Procedures in place, which are reviewed on an annual basis. BAL receives information from the WHO and work with PHE and NSC to ensure arrangements are unified and in line with any current risks. This is the case with the current COVID-19 pandemic, and it would continue to be the case under the Proposed Development, including working with any successor to PHE.

9.5.49 This ES Addendum health chapter has been undertaken in the context of the COVID-19 pandemic and of current activities relating to slowing the transmission of the SARS-CoV-2 virus. BAL follows Government guidance on COVID-19, operates protection and Port Health systems and liaises with the appropriate authorities with regards to Port Health. It is BAL's duty to ensure an appropriate level of public health protection is maintained in relation to its facilities and activities. The COVID-19 pandemic does not change the conclusions of the original ES health chapter discussion of healthcare services.

9.5.50 From an operational airport perspective, at the time of writing, the effects of COVID-19 are likely to be short- to medium-term, e.g. in relation to travel restrictions. From a public health perspective, whilst the severity of the COVID-19 pandemic is likely to reduce in the short- to medium-term, mediated by vaccines and treatments currently in development and the continuing use of non-pharmaceutical interventions, the influence of COVID-19 on society and population health is likely to be long-term. This reflects underlying complexities in the way COVID-19 disproportionately affects the most vulnerable members of society and is exposing inequalities. Effects are both directly due to COVID-19 and indirectly due to how NHS use has been affected for those with other conditions. Premature mortality for those with existing poor health across all ages is increased, particularly older people. Increased morbidity due to long-term or permanent effects of surviving COVID-19 is also increased. For assessment purposes, it is reasonable to assume that population sensitivity is increased to some degree due to COVID-19. This would not be evenly distributed and is likely to predominantly affect vulnerable groups, e.g. those with existing poor health, those with low incomes and the elderly. As vulnerable groups were already allocated a 'high' sensitivity rating within the original ES health chapter assessment, the highest level of sensitivity on the assessment scale, those assessment findings remain valid. This long-term view of COVID-19 is specific to the health assessment and other ES Addendum topic chapter perspectives on COVID-19 effects being short-term may be valid in those contexts.

9.5.51 Although the sensitivity of healthcare services, their staff and patients has increased under pandemic conditions, the original ES findings with regard to sensitivity remain appropriate. The sensitivity of the general population was found to be medium and the sensitivity for vulnerable groups, including patients and healthcare services under additional pressure, was found to be high.

9.5.52 The effects on healthcare services when the Proposed Development is in operation continue to relate to potential changes in unplanned need for NHS attendance whilst at (or travelling to or from) Bristol Airport. The main potential health outcomes result from direct effects on the quality of NHS services and indirect effects on early diagnosis, treatment outcomes and preventative measures. This additional use of NHS services, separate to that accounted for within routine NHS service planning, is assumed to relate to a small proportion of Bristol Airport staff, passengers and airport visitors. Any effect is likely to relate to a small demand for GP emergency appointments by non-registered patients, or attendance at A&E, including transport by ambulance. GP attendance may include the potential for a small increase in demand for 'fitness to fly' assessments where such assessments are requested by the airline once the passenger is already at the airport. Most staff

and many passengers/visitors are likely to be within existing catchment areas for routine healthcare service planning. For other passengers/visitors, Bristol Airport, and any associated use of NHS services, is part of the context in which NHS routine service planning occurs. The airport is one part of general demand above that based on the resident population or patient list size. The level of that demand is not calculated. The timescales of the Proposed Development allow for NHS service planning and BAL can provide information to support this. This would enable NHS services to be in a position to accommodate any increase in demand.

9.5.53 Whilst the population health effects of COVID-19 are likely to be long-term, acute pressure on the NHS is expected to be short- to medium-term, with limited potential to overlap with any additional demand of the Proposed Development in the 2030 assessment year. Current expectations are that COVID-19 vaccines and treatments will have advanced by the point of operational effects of the Proposed Development. This is, however, an evolving situation.

9.5.54 The original ES health chapter assessment conclusions remain valid. The original ES health chapter conclusion was that the effect would be **negligible** for the general population and **minor adverse** (**not significant**) for vulnerable groups.

Climate change

9.5.55 The original ES health chapter discusses climate change effects associated with the operation of the Proposed Development from **paragraphs 16.11.66** to **16.11.76**.

9.5.56 NSC's March 2020 Committee Report[81] made the following statement in relation to the original ES health chapter assessment of operational climate change effects: "*The HIA suggests that the change arising from the proposed development would not be significant in the context of UKs climate change obligations … They consider the significance of the effect would be negligible for the general population and minor adverse for vulnerable groups … Officers agree with this conclusion*".

9.5.57 ES Addendum **Chapter 10: Carbon and Other GHGs** finds the conclusions for an effect on global climate due to the Proposed Development would be the same as the original ES. Compared to the original ES Chapter 17: Carbon and Other GHGs, total emission calculations are reduced, and embedded mitigation is enhanced. Bristol Airport has also made a carbon neutral commitment[82].

9.5.58 For climate change, the main potential health outcomes (globally) are heat-related disorders, respiratory disorders, infectious diseases, food insecurity and mental stress associated with natural disasters. Adverse effects fall most heavily on the poorest and most vulnerable members and regions of society (globally). The change due to the Proposed Development would be very small within the national emissions context. ES Addendum **Chapter 10: Carbon and Other GHGs** rates the magnitude as minor and contextualises it within the relevant carbon budgets and targets at a national level, including the UK's transition to 'net zero' by 2050.

9.5.59 It is appropriate to note that as an issue, climate change is being addressed through international agreement, with emissions targets and strategies set at the national level not the individual project level.

9.5.60 The operational contribution by the Proposed Development to climate altering pollutants should therefore be considered long-term, making an incremental addition to climate change related risk factors for population health (globally).

[81] See footnote 12

[82] Bristol Airport Limited (2019). Carbon Roadmap. [online]. Available at: https://www.bristolairport.co.uk/about-us/environment/carbon-roadmap [Accessed 18 November 2020].

9.5.61 The original ES health chapter assessment conclusions remain valid. The original ES health chapter conclusion was that the effect would be **negligible** for the general population and **minor adverse** (**not significant**) for vulnerable groups.

Faster and Slower Growth Scenarios

9.5.62 This ES Addendum health chapter concludes, following a qualitative analysis, that neither the Core Case, nor the Faster or Slower Growth Cases would change the conclusions of the original ES health chapter.

9.5.63 Overall, across the health topics, the Faster and Slower Growth Case variations are likely to remain within the envelope discussed for the Core Case:

- The Faster Growth Case (12 mppa in 2027) would have had three year's less opportunity to progress fleet modernisations. Aircraft emission levels (e.g. air and ground noise) would therefore be expected to be slightly higher. There would also be three years less population and economic growth, though the rate of economic growth is assumed to be faster than the Core Case. The relative 'With Development' compared to 'Without Development' change is likely to be small given the Faster Growth Case brings forward both the year 10 mppa is reached and the year 12 mppa is reached. The Faster Growth Case is characterised as being slightly 'more intensive' but potentially affecting a slightly smaller population.
- The Slower Growth Case (12 mppa in 2034) would have had four additional years to progress fleet modernisations. Aircraft emission levels (e.g. air and ground noise) would therefore be expected to be slightly lower. Road traffic emissions may increase over time due to an increase in the number of vehicles on the road. By 2034 vehicle and road surface modernisations including the transition to electric vehicle may, however, also act to reduce emissions to air and noise. However, noise from the interaction between tyres and road surface, particularly at higher speeds is likely to continue to be the largest source of noise. Under the Slower Growth Case there would also be four years more population and economic growth compared to the Core Case, though the rate of economic growth is assumed to be slower. The Slower Growth Case is characterised as being slightly 'less intensive' but potentially affecting a slightly larger population.

9.5.64 The conclusions outlined above are consistent with the Faster and Slower Growth Case conclusions reached in the ES Addendum for **Traffic and Transport (Chapter 5), Noise and Vibration (Chapter 6), Air Quality (Chapter 7), Socio-economics (Chapter 8) and Carbon** and **Other Greenhouse Gases (Chapter 10)**.

9.5.65 For the Faster and Slower Growth Cases, as with the Core Case: the beneficial economic effects are considered **significant** for population health; and the adverse effects are considered **not-significant** for population health.

Summary of predicted effects and their significance

9.5.66 A summary of the results of the supplementary assessment of **Human Health** operational effects is provided in **Table 9.1.** The significance scores align with the original ES **Table 16.10** and **Table 16.11**.

Table 9.1 Summary of significance of human health effects

Health issues and population groups	Significance	Summary rationale
Operation – Air quality		On the basis that the inputs to this ES Addendum health chapter from ES Addendum **Chapter 7: Air Quality** are showing either no change or an improvement compared to the original ES Chapter 8: Air Quality assessment, the conclusions of the original ES health chapter remain valid and are unchanged.
General population	Negligible	
Vulnerable groups	Up to minor adverse	
Operation – Noise		On the basis that the inputs to this ES Addendum health chapter from ES Addendum **Chapter 6: Noise and Vibration** are showing show similar or lower impacts compared to the original ES Chapter 7: Noise and Vibration assessment, the conclusions of the original ES health chapter remain valid and are unchanged.
General population	Negligible	
Vulnerable groups	Up to minor adverse	
Operation – Traffic effects		On the basis that the inputs to this ES Addendum health chapter from ES Addendum **Chapter 5: Traffic and Transport** are unchanged compared to the original ES Chapter 6: Traffic and Transport assessment, the conclusions of the original ES health chapter remain valid and are unchanged.
General population	Negligible	
Vulnerable groups	Up to minor beneficial	
Operation – Economic effects		On the basis that the inputs to this ES Addendum health chapter from ES Addendum **Chapter 8: Socio-economics** are unchanged compared to the original ES Chapter 15: Socio-economics, the conclusions of the original ES health chapter remain valid and are unchanged.
General population	Up to minor beneficial	
Vulnerable groups	Up to moderate beneficial	
Operation – Community identity		On the basis that the inputs to this ES Addendum health chapter from the original ES Chapter 9: Landscape and Visual and from ES Addendum **Chapter 8: Socio-economics** are unchanged compared to the original ES Chapter 15: Socio-economics, the conclusions of the original ES health chapter remain valid and are unchanged.
General population	From minor adverse up to moderate beneficial	
Vulnerable groups	From minor adverse up to moderate beneficial	
Operation – Healthcare services		The timescales of the Proposed Development continue to allow for NHS service planning and BAL can provide information to support this. This would enable NHS services to be in a position to accommodate any increase in demand. The COVID-19 pandemic does not change the conclusions of the original ES health chapter discussion of healthcare services.
General population	Negligible	
Vulnerable groups	Up to minor adverse	
Operation – Climate change		On the basis that the inputs to this ES Addendum health chapter from ES Addendum **Chapter 10: Carbon and Other GHGs** are unchanged compared to the original ES Chapter 17: Carbon and Other GHGs, the conclusions of the original ES health chapter remain valid and are unchanged.
General population	Negligible	
Vulnerable groups	Up to minor adverse	

9.5.67 These predicted effects are based on the assessment for the year 2030, but the conclusions are considered to be robust against the 2027 Faster Growth Case and 2034 Slower Growth Case.

9.6 Additional mitigation

9.6.1 No additional mitigation is required as a result of the supplementary information.

9.7 Conclusions of significance evaluation

9.7.1 The original ES health assessment has been reviewed in light of the changes set out in **paragraph 9.1.2**. This has been informed by a review of the other chapters of this ES Addendum set out in **paragraph 9.1.1**.

9.7.2 NSC's March 2020 Committee Report[83] reached the following conclusion in relation to the original ES health chapter: "*BAL's projected Health Impact Assessment is realistic. There are no overriding health or well-being impacts which would warrant refusal of the application, albeit this is contingent on impacts being mitigated in accordance with the planning conditions and planning obligations recommended in this report.*"

9.7.3 The delay to the 12 mppa year affects the timeframe over which both negative and positive population health effects would be experienced. The influence of such delay would be to marginally reduce the negative and positive effects with reference to the original assessment years (notably 2026). The full effect would still be anticipated four years later in 2030 as a Core Case. The assessment scope and methodology remain valid.

9.7.4 This ES Addendum health assessment of the Core Case concludes that beneficial effects, such as investment and employment due to the Proposed Development, are likely to protect and improve health and so have a positive influence on population health outcomes. Compared to the consented increase to a 10 mppa capacity, the Proposed Development's **beneficial effects** are considered **significant** for population health.

9.7.5 Whilst there would be some localised increases in adverse effects for people living closest to the airport; at the population level, the Proposed Development is unlikely to result in a discernible change to health outcomes. Compared to the consented increase to a 10 mppa capacity, the Proposed Development results in similar environmental exposures. The Proposed Development's **adverse effects** are considered **not significant** for population health.

9.7.6 The judgement is that the original ES health assessment conclusions on significance are robust and would be unchanged under the scenario of a delay to the 12 mppa year and the effects from an adjusted aircraft fleet mix and ATMs. Furthermore, the Faster (2027) and Slower (2034) Growth Cases would not affect the conclusion for the 2030 Core Case.

[83] See footnote 12

10. Carbon & Other GHGs (climate change)

10.1 Introduction

10.1.1 This chapter of the Environmental Statement (ES) Addendum supplements **Chapter 17: Carbon and Other Greenhouse Gas Emissions** of the original ES (December 2018) and should be read in conjunction with this document.

10.1.2 This supplementary information takes account of the following:

- Updated national, regional and local legislation, policy and best practice;
- Change in Assessment Year from 2026 to 2030 (year in which 12 mppa will be reached). 2030 is the Core Case assessed within this chapter;
- A Faster Growth Case (where 12 mppa is reached in 2027) and a Slower Growth Case (where 12 mppa is reached in 2034) in comparison to the Core Case;
- Change in passenger forecasts;
- Updated transport modelling;
- Updated fleet mix forecasts;
- Updated Greenhouse Gas (GHG) emissions factors;
- Updated embedded measures to reduce GHG emissions;
- Emerging additional measures to reduce GHG emissions;
- An assessment of the GHG emissions from passenger leakage from the South West to airports in other regions (see **Appendix 10B** of the ES Addendum);
- Updated approach to defining the effect of GHGs from the Proposed Development on the global climate.

10.1.3 The quantitative assessment uses a Core Case growth estimate of 2030 as the year when 12 mppa is expected to be reached. Consideration has also been given to a Faster Growth Case and Slower Growth Case (Assessment Years of 2027 and 2034).

10.2 Relevant legislation, planning policy and technical guidance

10.2.1 Since the original ES (December 2018), new or updated legislation, planning policy and technical guidance has been published that has relevance to the assessment of the effects of the Proposed Development on carbon and other GHG receptors. These are described below. All other relevant legislation, planning policy and technical guidance can be found in **Section 17.3** of the original ES (December 2018).

Legislative context

10.2.2 The core legislation that is of relevance to this assessment is the Climate Change Act 2008[84], as amended in 2019. The Act now commits the Secretary of State to ensure that the net UK carbon account for the year 2050 is at least 100% lower than the 1990 baseline ('the UK carbon target'). The UK carbon target is now often referred to as 'net zero'. The Act also requires the Secretary of State to set successive five-year carbon budgets ('the UK carbon budgets') to meet the UK carbon target for 2050[85]. The original (i.e. unamended) version of the Act was considered in the original ES (December 2018) assessment and committed the UK to an 80% reduction in the net UK carbon account.

10.2.3 International aviation is not part of the 'net UK carbon account' and so is not included in the UK carbon target or the UK carbon budgets, but the UK carbon budgets are to be set 'having regard to' international aviation[85]. In practice, the successive carbon budgets have been set allowing for 'headroom' for what is sometimes referred to as the 'planning assumption' (also referred to as the 'aviation target'). The 'planning assumption' that has been allowed for in all carbon budgets to date is 37.5Mt CO_2 (37 500Kt CO_2). Thus the latest (i.e. Fifth) carbon budget for the UK as a whole for the period to 2028-2030 is set at 1,765 Mt CO_{2e} (reflecting – that is excluding – a 'planning assumption' of 37.5Mt CO_2 for international aviation). This 'planning assumption' reflects the advice of the Committee on Climate Change (CCC) in 'Meeting the UK aviation target – options for reducing emissions to 2050' (Dec 2009)[86].

10.2.4 In 2019 the CCC recommended to the Department for Transport (DfT) that international aviation (and shipping) are brought into the Sixth UK carbon budget[87], due to be released in December 2020.

10.2.5 The UK is part of the European Union (EU) Emissions Trading Scheme (ETS)[88], a cap-and-trade mechanism in which an allowance for annual carbon emissions from various sectors has been agreed at the EU level. The 2012 extension of EU ETS incorporated emissions from aviation flights to and from EU countries, although following appeal it only applies to domestic flights.

Planning policy context

10.2.6 Since the original ES (December 2018), new policies have been released while a number have been updated or revised. The Draft West of England Joint Spatial Plan[89], which was used in the original

[84] The UK Government. (2008). Climate Change Act 2008. [online]. Available at: http://www.legislation.gov.uk/ukpga/2008/27/contents [Accessed 21 October 2020].
[85] The UK Government. (2016). Carbon Budgets. [online]. Available at: https://www.gov.uk/guidance/carbon-budgets [Accessed 21 October 2020].
[86] Committee on Climate Change. (2009). Meeting the UK aviation target – options for reducing emissions to 2050. [online]. Available at: https://www.theccc.org.uk/wp-content/uploads/2009/12/CCC-Meeting-the-UK-Aviation-target-2009.pdf [Accessed 21 October 2020].
[87] Committee on Climate Change (2019), "Letter: International aviation and shipping and net zero", [online]. Available at: https://www.theccc.org.uk/wp-content/uploads/2019/09/Letter-from-Lord-Deben-to-Grant-Shapps-IAS.pdf [Accessed 21 October 2020].
[88] European Parliament and the Council of the European Union. (2003). Establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC (the EU Emissions Trading System. [online]. Available at: http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32003L0087&from=EN [Accessed 21 October 2020].

[89] Bath and North East Somerset Council, Bristol City Council, North Somerset Council and South Gloucestershire Council. (2017). West of England Joint Spatial Plan November 2017. [online] Available at: https://www.bristol.ac.uk/media-library/sites/estates/documents/West_of_England_Joint_Spatial_Plan__Publication_Document_2017%20(5).pdf [Accessed 17 November 2020].

ES, has now been withdrawn. In this ES Addendum, the North Somerset Core Strategy[90], which predates the original ES, has taken precedence at a local level and is described below.

10.2.7 In addition to the overarching policies outlined in **Section 10.3** of the ES Addendum, the following changes relevant to this assessment are set out below in **Table 10.1.**

Table 10.1 Policy relevant to the carbon and other GHGs emission assessment (updated or entered into force since the original ES)

Policy reference	Implications
Emerging UK ETS[91]	The UK Government is developing a mechanism to replace the EU ETS when the transition period of exiting the EU ends, as set out in the policy paper '*The future of UK carbon pricing*'[92]. The final policy, to enter force in 2021, is expected to reduce the existing emissions cap by 5% compared to the current EU system. The proposed aviation routes include UK domestic flights, flights between the UK and Gibraltar, flights from the UK to European Economic Area states, and flights from the UK to Switzerland.
National Planning Policy Framework[93] (NPPF)	The NPPF acts as guidance for local planning authorities and decision-makers, both for developing plans and making decisions about planning applications. Previous versions of the NPPF were published in March 2012, and revised in July 2018. The latter was referenced in the original ES (December 2018). The NPPF was further revised in February 2019. Paragraphs 148, 150 and 153 described in the original ES (December 2018) remain valid for the assessment of carbon and other GHGs.
The Ten Point Plan for a Green Industrial Revolution[94]	This plan sets out the UK Government's approach to "build back better" following the impacts of the COVID-19 pandemic in 2020. It includes details of how the Government intends to accelerate the path to net zero in line with the commitment made in the Climate Change Act (amended). Included within the plan of relevance to this assessment is the accelerated shift to zero emission vehicles with a ban on sales of new petrol and diesel cars and vans from 2030, which is 10 years ahead of the previous target. The plan also includes commitments to take "*steps to drive the uptake of sustainable aviation fuel, investment in R&D to develop zero-emission aircraft and developing the infrastructure of the future at our airports*". Consultation on the Aviation Decarbonisation Strategy is planned for 2021.
North Somerset Core Strategy[90]	The North Somerset Core Strategy, adopted in January 2017, sets out the broad long-term visions, objectives and strategic planning policies for North Somerset up to 2026. Policies within it that are relevant to this assessment include:

[90] North Somerset Council (2017). Core Strategy, [online]. Available at: https://www.n-somerset.gov.uk/sites/default/files/2020-07/core%20strategy.pdf [Accessed 21 October 2020].

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

[92] The UK Government (2020). The future of UK carbon pricing – UK government and devolved administrations' response [online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/889037/Government_Response_to_Consultation_on_Future_of_UK_Carbon_Pricing.pdf [Accessed 17 November 2020].

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

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

Policy reference	Implications
	• **CS1: Addressing climate change and carbon reduction.** The Core Strategy sets out that developments should demonstrate a commitment to reducing carbon emissions and tackling climate change. • **CS2: Delivering sustainable design and construction**. The Core Strategy sets out that non-residential developments should increase energy efficiency through design and prioritise the use of sustainable low or zero carbon forms of renewable energy generation. • **CS23: Bristol Airport**. The Core Strategy sets out how the development of Bristol Airport will be required to demonstrate satisfactory resolution of environmental issues, including climate change.
Creating Sustainable Buildings and Places in North Somerset Supplementary Planning Document (SPD)[95]	Adopted in March 2015, this document provides further detail and guidance in respect to the implementation of Policies CS1 and CS2 of the Core Strategy including a checklist for developments and sustainable design principles.
Sites and Policies Plan Part 1: Development Management[96]	Policy DM50 of the Sites and Policies Plan Part 1: Development Management Policies stipulates that development within the Green Belt inset at Lulsgate will be permitted provided that (inter alia) environmental impacts such as emissions are minimised.
Local Plan 2038: Challenges for the Future[97]	Since the original ES, NSC has started the process of preparing a new Local Plan. The Challenges and Issues document underwent consultation from July to September 2020, with a further consultation from November to December 2020. The impact of climate change was stated as one of the challenges and issues to be addressed in the Plan with NSC's commitment to be carbon neutral by 2030 being a key objective. It is stated that "*all new buildings will be expected to meet more stringent standards regarding energy use, design and construction*", and that low carbon development and renewable energy use should be maximised in order to deliver the 'zero-carbon ambition'.

Local targets, budgets and action plans

10.2.8 At a local level there are no binding GHG targets, although the North Somerset Climate Emergency Strategy 2019[98] and accompanying Action Plan[99], published in 2019, set out a commitment that

[95] North Somerset Council (2015). Creating Sustainable Buildings and Places in North Somerset Supplementary Planning Document. Available online: https://www.n-somerset.gov.uk/sites/default/files/2020-03/Creating%20sustainable%20buildings%20and%20places%20supplementary%20planning%20document.pdf [Accessed 21 October 2020].

[96] North Somerset Council (2016). Development Management Policies: Sites and Policies Plan Part 1, [online]. Available at: https://www.n-somerset.gov.uk/sites/default/files/2020-04/sites%20and%20policies%20plan%20part%201%20development%20management%20policies%20July%202016.pdf [Accessed 21 October 2020].

[97] North Somerset Council (2020). Local Plan 2038: Challenges for the Future, [online]. Available at: https://www.n-somerset.gov.uk/sites/default/files/2020-07/Local%20Plan%202038%20-%20Challenges%20for%20the%20Future.pdf [Accessed 21 October 2020].

[98] North Somerset Council (2019). North Somerset Climate Emergency Strategy, [online]. Available at: https://www.n-somerset.gov.uk/sites/default/files/2020-02/North%20Somerset%20climate%20emergency%20strategy%202019.pdf [Accessed 21 October 2020].

[99] North Somerset Council (2019). North Somerset Climate Emergency Strategic Action Plan, [online]. Available at: https://www.n-somerset.gov.uk/sites/default/files/2020-02/North%20Somerset%20climate%20emergency%20action%20plan.pdf [Accessed 21 October 2020].

"*North Somerset will aim to be a… carbon neutral area by 2030*". This strategy does not specifically mention aviation.

10.2.9 The Climate Emergency Action Plan[99] suggests that a 2030 carbon neutral target for North Somerset is reasonably achievable, although the carbon reduction plan to achieve carbon neutrality for the whole area it is not yet set out. As a result, for the purposes of this assessment, the non-aviation GHG emissions from the expansion of Bristol Airport are considered within the context of a 2030 carbon neutral North Somerset, with an acknowledgement that the policy landscape may evolve.

Technical and other policy guidance

10.2.10 **Table 10.2** lists new and updated guidance documents which are relevant to the carbon and other GHGs emission assessment. Additionally, it includes international guidance documents that are relevant to the assessment that were not taken into account in the original ES. All other technical guidance can be found in **Section 17.3** of the original ES (December 2018).

Table 10.2 Technical guidance relevant to the carbon and other GHGs emission assessment

Guidance	Relevance
Carbon Management Standards and Guidance	
BS EN ISO 14064-1 (2019)[100]	ISO 14064-1 sets out guidance for quantification and reporting of GHG emissions and removals. The methodology for quantification of greenhouse gases in **Section 10.6** follows this guidance and the stated guidance on reporting has been taken into account as part of this assessment.
Policy Strategies and Guidance	
Aviation 2050: The Future of UK Aviation[101]	The Aviation 2050 strategy was under consultation from December 2018 to June 2019. It was published after the original ES but prior to the CCC's net zero recommendation[102] and the subsequent update to the Climate Change Act[84]. While the response from the Government is expected imminently, it does not yet represent adopted policy. Nevertheless, the consultation document states the Government's intention to "*leave 'headroom' for international aviation when setting carbon budgets so that the economy as a whole is on a trajectory to meeting the 2050 Climate Change Act target (including international aviation). To set a clear level of ambition for the sector, the government proposes to: accept the CCC's recommendation that emissions from UK departing flights should be at or below 2005 levels in 2050 [37.5 $MtCO_2$]*." Such consideration has therefore been applied to the updated carbon assessment of the Proposed Development.

[100] British Standards Institute. (2019). BS EN ISO 14064-1: 2019 Greenhouse gases. Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals.
[101] The UK Government. (2018). Aviation 2050: The future of UK aviation. A consultation. [online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/769695/aviation-2050-web.pdf [Accessed 21 October 2020].
[102] Committee on Climate Change, (2019), "Net Zero: The UK's contribution to stopping global warming", [online]. Available at: https://www.theccc.org.uk/wp-content/uploads/2019/05/Net-Zero-The-UKs-contribution-to-stopping-global-warming.pdf [Accessed 21 October 2020].

Guidance	Relevance
	Since the development of the Aviation Strategy, the consultation document "the future of UK aviation: making best use of existing runways"[103] has been produced which sets out how UK carbon budgets can be met whilst increasing passenger numbers at airports other than Heathrow (based on the 37.5 $MtCO_2$ planning assumption). The Aviation Strategy will be considered as part of the Net Zero Aviation Consultation which is due to be published in Autumn/Winter 2020[104].
Committee on Climate Change, Net Zero. The UK's contribution to stopping global warming, 2019[102]	Published following the original ES, the report responds to a request from the UK governments to provide updated advice on the UK's long-term emission target, including the possibility of setting a "net-zero" target, following recent Intergovernmental Panel on Climate Change (IPCC) reports[105]. The report suggests that the UK "*should set and vigorously pursue an ambitious target to reduce greenhouse gas emissions (GHGs) to 'net-zero' by 2050*". The report recommends strengthening aviation policies for both domestic and internationally agreed policies. The report also recognises the importance of Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) and highlights that policy will need to be based on robust rules that deliver genuine emission reduction. The UK Government has accepted the CCC advice and amended the carbon reduction target in the Climate Change Act 2008 to achieve net-zero in 2050[84].
Committee on Climate Change: Reducing UK Emissions 2020 Progress Report to Parliament[106]	This report sets out the UK's progress against emissions reduction targets to 2050, incorporating the updated net zero target not available at the time of the original ES. The Progress Report is updated annually. The report reiterates the previous CCC recommendation[87] that international aviation and shipping should be formally included in UK climate targets when the Sixth Carbon Budget is set (in December 2020).
Government's Response to the Committee on Climate Change's 2020 Progress Report to Parliament[104]	This document represents the UK Government's response to the CCC's 2020 Progress Report[106], and sets out policy recommendations for departments. The Government announced that it will publish a consultation on net zero aviation and that it is committed to negotiating in the International Civil Aviation Organization (ICAO) for a long-term emissions reduction goal for international aviation that is consistent with the temperature goals of the Paris Agreement[107]. The Government also stated that it would be minded to include international aviation and shipping in UK carbon budgets if there is insufficient progress at the international level. The Government also stressed that "*Airport expansion is a core part of boosting our global connectivity and levelling up across the UK*".

[103] HM Government (2018). Beyond the horizon: The future of UK aviation. Making best use of existing runways. [online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/714069/making-best-use-of-existing-runways.pdf [Accessed 21 October 2020].
[104] The UK Government, (2020), Government response to the Committee on Climate Change 2020 progress report to Parliament: reducing UK emissions. [online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/928005/government-response-to-ccc-progress-report-2020.pdf [Accessed 17 November 2020].
[105] IPCC (2018), "Special Report: Global Warming of 1.5°C", [online]. Available at https://www.ipcc.ch/sr15/ [Accessed 21 October 2020].
[106] Committee on Climate Change. (2020). Reducing UK emissions: 2020 Progress Report to Parliament, [online]. Available at: https://www.theccc.org.uk/publication/reducing-uk-emissions-2020-progress-report-to-parliament/ [Accessed 21 October 2020].
[107] United Nations Climate Change. (2015). The Paris Agreement [online]. Available at: https://unfccc.int/files/essential_background/convention/application/pdf/english_paris_agreement.pdf [Accessed 21 October 2020].

Guidance	Relevance
Decarbonising Transport: Setting the Challenge[108]	Since the submission of the planning application, the UK Government has begun the process of developing a plan to accelerate the decarbonisation of the transport sector. The Transport Decarbonisation Plan (TDP) is expected later in 2020. This initial document describes the challenges and potential policy proposals that will need to be developed to achieve a coordinated plan for decarbonising transport. It recognises airport expansion as a "*core part of boosting our global connectivity and levelling up across the UK*". It stresses that "*action at an international level is the Government's preferred approach for addressing aviation's international carbon emissions*". Further work is planned on developing the uptake of low carbon fuels in aviation. International aviation emissions from Bristol Airport are considered against the planning assumption for aviation emissions as indicated by DfT in the Aviation Strategy[101].
Aviation GHGs Guidance and Strategies	
Committee on Climate Change Letter on International Aviation and Shipping and Net Zero (2019)[87]	This 2019 letter was published after the original ES and responds to the Government's request for advice on bringing international aviation and shipping (IAS) emissions formally within the net-zero target. For international aviation, the CCC advise a primary policy approach of international framing while still setting domestic targets. It is recognised that "*Zero-carbon aviation is highly unlikely to be feasible by 2050*" yet reduced emissions are suggested through "*a combination of fuel efficiency improvements, limited use of sustainable biofuels, and by managing demand growth*". It is acknowledged that the use of GHG removal offsets (e.g. CORSIA) will be essential for reducing emissions in the IAS sectors. The CCC's 'Future Ambition' case was based on a scenario for achieving net-zero by 2050 that kept GHG emissions from international aviation to around 30 $MtCO_2$ in 2050 IAS emissions have not formally been brought within the UK carbon budgets[85]; however, international aviation emission from Bristol Airport are contextualised in the GHG assessment.
Bristol Airport Carbon Roadmap (2019)[109]	Bristol Airport's Carbon Roadmap sets out how Bristol Airport will achieve its ambition to be a net zero airport, including becoming carbon neutral for direct emissions by 2025. It includes a timeline of broad actions that Bristol Airport will be taking to achieve a low carbon future, including increased use of electric vehicles and a shift to renewable energy sources. The roadmap addresses direct emissions, passenger journeys to and from the airport and emissions from flights.
Sustainable Aviation Carbon Road-Map: A Path to Net Zero[110]	Sustainable Aviation is a group of UK airlines, airports, aerospace manufacturers and air navigation service providers which aim to set out a collective and long term strategy to ensure a sustainable future for UK aviation. In 2020, the group published the Sustainable Aviation Carbon Road-Map: A Path to Net Zero, to which Bristol Airport is a signatory. This report sets out how the UK "*can accommodate a 70% growth in passengers by 2050 whilst reducing net carbon emissions levels from just over 30 million tonnes of CO_2 year down to zero through smarter flight operations, new aircraft and engine technology, modernising our airspace, the use of sustainable aviation fuels and significant investment in carbon reductions through smart market-based policy measures*". Bristol Airport is aligned to the goals of

[108] Department for Transport (2020). Decarbonising Transport: Setting the Challenge. [online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/876251/decarbonising-transport-setting-the-challenge.pdf [Accessed 21 October 2020].
[109] Bristol Airport Limited (2019). Carbon Roadmap. [online]. Available at: https://www.bristolairport.co.uk/about-us/environment/carbon-roadmap [Accessed 21 October 2020].
[110] Sustainable Aviation (2020). Sustainable Aviation Carbon Road-Map: A path to Net Zero. Available online at: https://www.sustainableaviation.co.uk/wp-content/uploads/2020/02/SustainableAviation_CarbonReport_20200203.pdf [Accessed 21 October 2020].

Guidance	Relevance
	Sustainable Aviation and achieving the road-map, as demonstrated in the Bristol Airport Carbon Roadmap[82].
International Scientific Reports	
Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (AR5): Synthesis Report, 2014[111]	The Fifth Assessment Report (AR5) from the IPCC was published in 2014 and provides robust evidence that "*human influence on the climate system is clear*". It stresses the long-term risk associated with future increases in GHG emissions that "*will cause further warming and long-lasting changes in all components of the climate system, increasing the likelihood of severe, pervasive and irreversible impacts for people and ecosystems*". The IPCC report underpins the international response in terms of international agreements and carbon budgets as "*substantial emissions reductions over the next few decades can reduce climate risks in the 21st century and beyond*". These factors are used to contextualise the GHG emissions created by the Proposed Development. The sixth report (AR6) is expected in June 2022.
Intergovernmental Panel on Climate Change (IPCC) Special Report (SR15): Synthesis Report, 2018[105]	In 2018, the IPCC released a special report on the climate change impacts of a temperature increase of 1.5°C above pre-industrial levels which is likely to be reached "*between 2030 and 2052 if [the trend] continues to increase at the current rate. (high confidence)*". The purpose of this report was to strengthen the global response to the threat of climate change. In response to this report, the UK Government requested their advisors, the CCC, to review the UK's Climate Change Act target. Following the CCC's advice[102] the UK Government subsequently amended the target in May 2019[84]. This revised target has been used in the context of this assessment.

Overview of current aviation policy landscape

10.2.11 As detailed above, the Climate Change Act requires the Secretary of State to ensure the net UK carbon account is 100% below the 1990 baseline by 2050[84]; in other words, 'net zero'. This target does not include emissions from international aviation, which are taken into account through the mechanism of leaving 'headroom' in UK carbon budgets and are to be tackled through the International Civil Aviation Organization (ICAO), following the approach adopted in the United Nations Framework Convention on Climate Change (UNFCCC) Kyoto Protocol[112].

10.2.12 Whilst zero-carbon aviation may be challenging by 2050, the UK is supporting international efforts through ICAO to achieve 'net zero' (i.e. a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases). In the consultation paper 'Aviation 2050: the future of UK aviation' (Dec 2018)[101], published after the original ES but prior to the CCC's net zero recommendation[102] and the subsequent update to the Climate Change Act[84], the Government seeks GHG emissions reductions from international aviation to be achieved through measures such as efficiency improvements and sustainable aviation fuels, with the offsetting of remaining emissions through mechanisms such as emissions trading and the ICAO CORSIA[113].

10.2.13 In its Response to the CCC's 2020 Progress Report to Parliament (October 2020)[104] , the Government has announced that it will publish a consultation on net 'zero' aviation. The

[111] IPCC (2014), "AR5 Synthesis Report – Climate Change", [online]. Available at: https://www.ipcc.ch/site/assets/uploads/2018/02/SYR_AR5_FINAL_full.pdf [Accessed 21 October 2020].
[112] United Nations (1998). Kyoto Protocol to the United Nations Framework Convention on Climate Change. [online]. Available at: https://unfccc.int/resource/docs/convkp/kpeng.pdf [accessed 17 November 2020].
[113] ICAO. (2016). Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA). [online]. Available at: https://www.icao.int/environmental-protection/CORSIA/Pages/default.aspx [Accessed 21 October 2020].

Government's approach to tackling aviation's GHG emissions consistent with the UK carbon target is expected to be set out in the forthcoming Aviation Strategy which will be considered as part of the Net Zero Aviation Consultation due in late 2020. Additionally, the Government is committed to negotiating in the ICAO for a long-term emissions reduction goal for international aviation that is consistent with the temperature goals of the Paris Agreement[107]. The Government also stated that it would be minded to include international aviation and shipping in UK carbon budgets if there is insufficient progress at international level.

10.2.14 In its 2019 letter[87] to DfT on international aviation and 'net zero', the CCC's 'Future Ambition' case was based on a scenario for achieving net-zero by 2050 that kept GHG emissions from international aviation to around 30 $MtCO_2$ in 2050. This figure has not, however, been adopted by Government as a new 'planning assumption' for setting future UK carbon budgets and so has not been considered as the core metric for contextualisation of GHG emissions from the Proposed Development in this assessment.

10.2.15 Given that there is no existing policy that endorses the 30 $MtCO_2$ CCC suggestion, the previous CCC recommendation of 37.5 $MtCO_2$[86] remains the most appropriate metric for understanding the future of the UK aviation industry in 2050 (as the Government has indicated it will be accepted in the Aviation 2050[101]). This is because the details of the route and specific mechanisms to reaching net zero across the UK economy in 2050 are not yet set out (it may be that other sectors are required to decarbonise further to accommodate aviation, for example). The 30 $MtCO_2$ figure used by the CCC is therefore only considered for sensitivity testing at this stage. The policy landscape is likely to be updated in the upcoming Aviation Strategy consultation and/or the sixth carbon budget (both due at the end of 2020).

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

- 37.5 $MtCO_2$ from international aviation departing the UK in 2050 is the 'planning assumption' used by UK Government in setting current UK carbon budgets under the Climate Change Act[84] and it remains the most appropriate value against which to consider the international aviation GHG emissions from the Proposed Development.
- 30 $MtCO_2$ from international aviation departing the UK represents a 'Future Ambition' scenario for international aviation to achieve 'net zero' in 2050, as described by the CCC[87]. It has therefore been adopted as a 'sensitivity test' value against which to consider the international aviation GHG emissions from the Proposed Development. This CCC figure is representative of what aviation policy *could* look like in the future to take into account the amended Climate Change Act (2019)[84].
- Achieving net zero requires increased sustainable fuel use, greenhouse gas removals/offsets and operational improvements, which will be driven by international sector-based mechanisms (such as the EU ETS[88] and CORSIA[113]). Robust and CORSIA-eligible offsetting opportunities in the UK, including substantial investment in Carbon Capture and Storage (CCS), are required to increase the extent amount of carbon removal in the UK.
- National and international-level responses to reducing aviation GHG emissions that have been put in place (e.g. Aviation Strategy, CORSIA) will be effective.
- All GHG emissions associated with the operation of Bristol Airport that are not from international aviation are considered within the context on the UK carbon target for 2050 and the UK carbon budgets. Aside from domestic aviation, these GHG emissions are also relevant to local carbon targets and plans as set by NSC.

10.3 Data gathering methodology

Desk study

10.3.1 This section updates information provided in **Section 17.4** of the original ES. The ES Addendum uses new and updated data sources since the original ES was published. These are noted below (no other changes have been made):

- Department for Business, Energy and Industrial Strategy (BEIS);
  - Emissions factors for traffic and transport emissions have been sourced from the BEIS GHG reporting conversion factors 2020[114];
  - Emissions factors for Scope 1 and 2 emissions have been sourced from the BEIS GHG reporting conversion factors 2019[115]; and
  - BEIS 2019 Energy and Emissions Projections (EEP)[116] are used in the development of the future scenarios for electricity mix.
- Bristol Airport Limited:
  - Existing carbon reduction initiatives and up-to-date energy data have been sourced from the Bristol Airport 2019 Annual Monitoring Report[117].
- DfT:
  - Factors for the proportion of cars, LGVs and other diesel, petrol and electric vehicles were sourced from the latest version of the DfT's TAG Data Book[118], reporting up to 2050.
  - Factors for the fuel efficiency of petrol, diesel and electric use in road vehicles, and diesel and electric use for rail transport were sourced from the latest version of the DfT's TAG Data Book[118], reporting up to 2050.
  - Information relating to future scenarios for the implementation of sustainable aviation fuel use was sourced from DfT's UK Aviation Forecasts 2017[119].
- National Grid:
  - Data has been sourced from the National Grid Future Energy Scenarios (FES) 2020[120] for the proportion of electric vehicles and electricity demand for electric vehicles, reporting up to 2050.

[114] BEIS (2020), Greenhouse gas reporting: conversion factors 2020 [online]. Available at https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2020 [Accessed 21 October 2020].
[115] BEIS (2019), Greenhouse gas reporting: conversion factors 2019 [online]. Available at https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2019 [Accessed 21 October 2020].
[116] BEIS (2020), Updated energy and emissions projections: 2019 [online]. Available at https://www.gov.uk/government/publications/updated-energy-and-emissions-projections-2019 [Accessed 12 November 2020].
[117] Bristol Airport Limited, (2020). Annual Monitoring Report 2019 [online]. Available at: https://www.bristolairport.co.uk/~/media/files/brs/about-us/environment/annual-monitoring-report-2019.ashx?la=en [Accessed 21 October 2020].
[118] Department for Transport (2020), TAG Data Book. Available at https://www.gov.uk/government/publications/tag-data-book [Accessed 21 October 2020].
[119] Department for Transport (2017), UK Aviation Forecasts, Moving Britain Ahead (Oct 2017) [online]. Available at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/878705/uk-aviation-forecasts-2017.pdf [Accessed 21 October 2020].
[120] National Grid (2020), Future Energy Scenarios, FES 2020. Available at https://www.nationalgrideso.com/future-energy/future-energy-scenarios/fes-2020-documents [Accessed 21 October 2020].

- Office of Road and Rail (ORR):
  - Emissions for rail passenger transport have been sourced from the ORR annual data tables for rail emissions up to 2019-2020[121].
- CCC:
  - Advice on the future uptake of sustainable aviation fuels and aircraft efficiency has been sourced from historical CCC reports[86, 122, 123] and guidance provided in letters to the Secretary of State for Transport[87, 124].
- Sustainable Aviation:
  - Emissions factors associated with improvements in air traffic management and operational practices have been sourced from the Sustainable Aviation Roadmap[110].
  - Information relating to the prospective use of sustainable aviation fuels and improvements in aircraft efficiency has been sourced from the Sustainable Aviation Roadmap[110].

10.3.2 There are also several new/updated datasets that have been produced as part of this assessment. These are listed below:

- Forecast of demand and aircraft movements (2024, 2030, 2040 and 2050);
- Updated transport modelling (2024, 2030); and
- Leakage of passengers from/to other airports (2030) (see **Appendix 10B** of the ES Addendum).

10.3.3 The baseline aviation GHG emissions have been updated to correct an error in the calculation of the Climb-Cruise-Descent (CCD) phase in the original ES related to the conversion of nautical miles to kilometres flown. This reduces the total 2017 aviation GHG emissions from 746.77 $ktCO_2/yr$ to 472.45 $ktCO_2/yr$ (see **Appendix 10C: Erratum A** of the ES Addendum). This error is replicated in the future projections in the original ES. All other baseline values remain the same as the original ES.

10.4 Environmental measures embedded into the development proposals

10.4.1 This section updates information provided in **Section 17.8** of the original ES. All of the environmental measures stated in **Table 17.7** of the original ES remain relevant to this ES Addendum. Further embedded mitigations have been identified since the original ES and are described below.

10.4.2 All measures in this section have been considered in the quantification of emissions, as set out in **Section 10.7**.

10.4.3 Since the production of the original ES, BAL has committed to becoming a carbon neutral airport by 2025 for Scope 1 and 2 emissions and has set an ambition of becoming a net zero airport by 2050 through its Carbon Roadmap published in July 2019[82].

---

[121] ORR (2020), Table 6100 - Estimates of normalised passenger and freight carbon dioxide equivalent (CO_{2e}) emissions. Available at https://dataportal.orr.gov.uk/statistics/infrastructure-and-emissions/rail-emissions/ [Accessed 17 November 2020].
[122] Committee on Climate Change (2018), Biomass in a low-carbon economy, Committee on Climate Change Nov 2018. Available at https://d423d1558e1d71897434.b-cdn.net/wp-content/uploads/2018/11/Biomass-in-a-low-carbon-economy-CCC-2018.pdf
[123] Committee on Climate Change (2012), Aviation – Fact Sheet. Available at https://www.theccc.org.uk/wp-content/uploads/2013/04/Aviation-factsheet.pdf
[124] Committee on Climate Change (2019), "Letter: Aviation 2050 – The future of UK aviation", [online]. Available at https://www.theccc.org.uk/wp-content/uploads/2019/02/Aviation-Letter-from-Lord-Deben-to-Chris-Grayling.pdf

10.4.4 The carbon neutral airport 2025 commitment has a greater reliance on offsetting of Scope 1 and 2 emissions, whereas the net zero airport 2050 ambition focusses on reducing Scope 1 and 2 emissions wherever practicable and then offsetting the residual emissions only where necessary.

10.4.5 The measures in **Table 17.7** of the original ES relating to surface access have been characterised in the modal splits used in the updated Transport Assessment (see **Chapter 5: Traffic and Transport** of the ES Addendum) and the implementation of an updated Airport Surface Access Strategy (ASAS) which will be secured by planning obligation. The modal share of passengers travelling to Bristol Airport by public transport in 2030 is 17.5% (based on the stretch target agreed with NSC officers) in the 'With Development' case and 15% in the 'Without Development' case.

10.4.6 Since the production of the original ES, BAL has shown leadership in carbon management by making a voluntary commitment to offsetting GHG emissions from passenger surface access journeys to and from the airport by road from 2020. To date, Bristol Airport is the first airport in Europe to offset passenger journeys. This has been embedded into the assessment when offsetting measures are considered. See **Section 10.6**, sub-section **Methodology for quantifying surface access GHG emissions** for more detail.

10.4.7 The measures in **Table 17.7** of the original ES relating to aviation GHG emissions have been characterised, where possible, in the assessment through the revised aircraft movement forecast and treatment of modern aircraft types in the GHG model. Bristol Airport is retaining the night movement quota count budget, where aircraft are counted according to their quota count classification. This classification system incentivises quieter aircraft which also provide increased fuel efficiency and therefore generally lower GHG emissions per aircraft.

10.4.8 Since the production of the original ES, BAL committed to and is purchasing 100% of electricity demand from renewable energy sources. See **Section 10.6**, sub-section **Methodology for quantifying airport buildings and ground operations GHG emissions** for a description of this.

10.4.9 In addition to the measures in **Table 17.7** of the original ES, BAL is continually improving the way in which GHG emissions are collated and reported through the Annual Monitoring Report. The Report is updated every year, with the 2019 data being made available in October 2020[117]. This ensures that progress against the Carbon Neutral 2025 commitment and Net Zero 2050 ambition made in the Carbon Roadmap[82] is transparent and quantifiable.

10.5 Scope of the assessment

Spatial scope

10.5.1 This section remains consistent with the information provided in **Section 17.7,** sub-section **Spatial scope** of the original ES.

10.5.2 The relevant receptor for each GHG emission source is the global climate. Given the global impacts of climate change and the "long term temperature goal" in the Paris Agreement[107] to hold the increase in global temperature to "*well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels*", the receptor is considered highly sensitive to GHG emissions. GHG emissions to the receptor are considered direct and negative.

Temporal scope

10.5.3 This section updates information provided in **Section 17.7,** sub-section **Temporal scope** of the original ES.

10.5.4 As described in **Section 3.2** of the ES Addendum, passenger growth forecasts have been updated since the original ES to account for the impacts of the COVID-19 pandemic on passenger numbers at Bristol Airport. The assessment has considered a Core Case which indicates passenger demand reaching 10 mppa by 2024 and increasing to 12 mppa in 2030. While other estimates of passenger growth would result in different trajectories in GHG emissions, the total emissions would be comparable and therefore only one estimate has been assessed in this chapter.

10.5.5 The temporal scope of the GHG assessment has been increased to consider quantifications of GHG emissions up to 2050. This takes account of airport operations up to the date of the UK Government's net zero target, as defined in the Climate Change Act 2008 (as amended)[84]. It also aligns with Bristol Airport's ambition for a net zero airport by 2050, as defined in the Carbon Roadmap[82].

10.5.6 Forecasts for GHG emissions in the 'With Development' case (i.e. a 12 mppa airport) are compared to forecasts for GHG emissions in the 'Without Development' case (i.e. a 10 mppa airport). In each case, forecasts are produced for the following assessment years:

- 2024 – the year at which the current planning capacity of 10 mppa is forecast to be reached;
- 2030 – the year at which the Proposed Development planning capacity of 12 mppa is forecast to be reached;
- 2040 – a representative mid-point between the Proposed Development capacity being reached and the UK Government's net zero legislative target[84]; and
- 2050 – the year of the UK Government's legislative net zero target[84].

10.5.7 Due to the long-lived nature of CO_2 in the global atmosphere, the effect of GHG emissions on the receptor are treated as permanent.

10.5.8 The assessment considers a Core Case growth estimate in which 12 mppa is reached in 2030. Qualitative assessments of the Faster and Slower Growth Cases (Assessment Years of 2027 and 2034) have been carried out and are reported in **Section 10.8** of the ES Addendum.

10.6 Assessment methodology

10.6.1 This section updates information provided in **Section 17.9** of the original ES. The assessment methodology adopted for the original ES has been supplemented with additional data, aircraft movement forecasting, emissions factors and scenarios for the purpose of improving the resolution and breadth of the assessment.

10.6.2 An additional assessment has been conducted to quantify the GHG emissions associated with the leakage of passengers from the South West region to other national UK airports (see **Appendix 10B** of the ES Addendum).

10.6.3 Baseline international aviation GHG emissions from flights departing the UK in 2017[125] are 36.3 $MtCO_2/yr$[126].

10.6.4 Baseline airport buildings and ground operations GHG emissions have been updated to take into account new data for 2019[117].

[125] 2017 is used as the baseline so as to be consistent with the original ES.
[126] BEIS (2020). Final UK greenhouse gas emissions national statistics: 1990 to 2018. [online]. Available at: https://www.gov.uk/government/statistics/final-uk-greenhouse-gas-emissions-national-statistics-1990-to-2018

10.6.5 The overall approach to quantifying GHG emissions associated with the Proposed Development is to forecast the relevant GHG emissions sources for the 'With Development' and the 'Without Development' scenarios in 2024, 2030, 2040 and 2050[127]. The GHG emissions sources are:

- Aviation;
- Surface access;
- Airport buildings and operations; and
- Construction (including embodied carbon).

10.6.6 The detailed methodology for quantifying each GHG emissions source can be found in **Appendix 10A** of the ES Addendum.

10.6.7 Emissions factors have been embedded into the GHG emissions calculations in the following areas:

- Vehicle splits by fuel type (petrol, diesel and electric vehicles) for cars, taxis and LGV;
- Vehicle efficiency improvements for cars, taxis, buses and coaches, and rail;
- UK grid electricity generation efficiency improvements;
- Air traffic management and operation improvements;
- Aircraft and engine efficiencies (only included beyond 2040 when the aviation forecasts flat-line)
- Sustainable aviation fuel (only included in 2050 in line with current projections available).

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

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

10.6.9 The Government's Ten Point Plan for a green industrial revolution[94] (released 18 November 2020) includes a commitment to bring forward the date at which sales of new petrol and diesel cars will be banned to 2030. Government and industry modelling of vehicle fuel splits under future scenarios have not yet been updated to reflect this new target. The scenarios used in this assessment are therefore considered conservative in all cases. For example, the most ambitious scenario considered for the lower emission scenario is based on the National Grid Future Energy Scenarios (FES) Leading the Way scenario which has an assumption that the sale of new petrol, diesel and hybrid cars and vans is ended from 2032.

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

[127] Construction is planned to occur from April 2022 to June 2029. Given that construction activities are likely to continue well into 2029, construction GHG emissions are considered within the 2024 and 2030 Assessment Years. Construction emissions are not considered beyond 2030.

10.6.11 Further description and information on the scenarios used are found in **Appendix 10A** of the ES Addendum.

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

10.6.12 This section supersedes information provided in **Section 17.9** of the original ES relating to determining the likely significance of effects of the Proposed Development.

10.6.13 Current IEMA principles and guidance[128, 129] state that due to the combined environmental effect that they have, any net GHG emissions (either positive or negative) from a project might be considered to be significant. Therefore, the assessment methodology aims to determine the relative scale of the impact of the Proposed Development on global climate change by considering the sensitivity (or value) of the receptor, its impact and the magnitude of that impact on relevant carbon budgets and targets at a national and local level.

Sensitivity

10.6.14 The only receptor for the GHG assessment is the global climate. The global climate is the largest inter-related cumulative environmental effect[128], so the receptor can be considered highly sensitive.

Magnitude

10.6.15 To identify the relative magnitude of GHG emissions of a single project on the receptor (i.e. the global climate), an approach for contextualisation must be used.

10.6.16 The magnitude of the Proposed Development will be evaluated against the following criteria:

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

  The scale of international aviation GHG emissions in the 'With Development' case is contextualised within the current UK 'planning assumption' for international aviation of 37.5 $MtCO_2$[86]. The CCC 'Further Ambition' value for GHG emissions from international aviation of 30 $MtCO_2$[87], which is not current Government policy, is also considered as a sensitivity assessment.

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

  The scale of the GHG emissions from all sources except international aviation in the 'With Development' case is contextualised within their overall impact on the UK Government's UK carbon target of 'net zero' in 2050 and UK carbon budgets[84]. The scale of the GHG emissions from all sources except aviation in the 'With Development' case is also considered within the context of local objectives for reducing GHG emissions. Therefore, the extent to which the Proposed Development affects the ability of NSC to meet its climate change objectives for a carbon neutral area by 2030[98] is taken into account. However, as the local objectives are not yet part of local planning policy, they are not given the same weight as the national Net Zero target[84] and the associated budgets[85].

[128] IEMA. (2017). Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance. [online]. Available at: https://www.iaia.org/pdf/wab/EIA%20Guide_GHG%20Assessment%20and%20Significance_IEMA_16May17.pdf [Accessed 21 October 2020]
[129] IEMA (2010). Climate Change Mitigation & EIA [online]. Available at: https://www.iema.net/document-download/33006 [Accessed 21 October 2020]

10.6.17 The magnitude of the GHG emissions from the Proposed Development is determined based on **Table 10.3**.

Table 10.3 Magnitude criteria

Magnitude	Magnitude criteria
High (adverse)	Net increases in GHG emissions associated with the Proposed Development are considered to materially affect the ability of the UK Government to meet its carbon targets/budgets
Low (adverse)	Net increases in GHG emissions associated with the Proposed Development are considered to not materially affect the ability of the UK Government to meet its carbon targets/budgets
Negligible	GHG emissions associated with the Proposed Development are approximately neutral compared to the Without Development case, and thus there is no implication for carbon budgets
High (beneficial)[130]	Net decreases in GHG emissions associated with the Proposed Development are considered to materially affect the ability of the UK Government to meet its carbon targets/budgets

Determination of effect

10.6.18 Given that the sensitivity of the receptor (i.e. the global climate) is always high and there is inevitably an overall increase in GHG emissions compared to the 'Without Development' case, there will be a residual adverse effect of the project on the global climate. The extent of that effect is assessed as described in **Table 10.4.**

Table 10.4 Determination of effect matrix

Magnitude	Effect
Negligible	None
Low	Minor
High	Major

10.6.19 In EIA terms and in line with other assessments including the original ES, a minor adverse effect is considered not significant, while a major adverse effect is considered significant.

Consideration of non-CO_2 aviation emissions

10.6.20 CO_2 makes up around 99% of the Kyoto Protocol[112] GHG emissions associated with aviation[119], with the other 1% coming from Nitrous Oxide (N_2O). The combustion of fuel by aircraft also results in emissions of water vapour, nitrogen oxides (NOx) and aerosols; furthermore, at altitude, condensation can result in the formation of linear ice clouds (contrails) and lead to further aviation-induced cloudiness; these are sometimes referred to as non-CO_2 effects. Recent research into the impacts of non-CO_2 effects has suggested that they could be up to three times that associated with CO_2 emissions alone[131].

10.6.21 While there is a high confidence level in CO_2 emissions from aviation sources, non-CO_2 effects are associated with much greater uncertainty. The confidence level has been based on a combination of evidence (limited, medium, robust) and agreement (low, medium and high). Confidence is low for contrail cirrus, low for emissions of nitrous oxides, medium for water vapour emissions in the

[130] Note that any reduction in GHG emissions compared to the 'Without Development' case are considered to have a high beneficial magnitude, so there is no low magnitude.
[131] Lee et al., (2020), "The contribution of global aviation to anthropogenic climate forcing for 2000 to 2018", *Atmospheric Environment*, 244 (117834), DOI: 10.1016/j.atmosenv.2020.117834

stratosphere (including soot and sulphur emissions) and very low for aerosol-cloud interactions. As such, these aviation effects remain areas of active climate change research and policy discussion.

10.6.22 The state of scientific knowledge on non-CO_2 effects is deemed too uncertain for accurate measurement at this stage and there is no consensus on how such effects should be measured, the metric against which to express any effect or the significance of such an effect.

10.6.23 As such, non-CO_2 effects for aviation are not currently included in any domestic or international legislation or emission targets, including the Paris Agreement[107]. The relevant expert body, the CCC, had advised that the appropriate approach at a domestic level was "*not to assess or include the impact of non-CO_2 effects, given the significant scientific uncertainty surrounding their scale*". The CCC has subsequently advised the UK Government that consideration should be given on "*how best to tackle [non-CO_2 effects] alongside UK climate targets*"[106], although this remains outstanding.

10.6.24 The Government has indicated that the net zero aviation consultation will provide information on the latest evidence on non-CO_2 effects[104]. They previously stated that the UK will work through the ICAO on measures to regulate aircraft non-CO2 effects, expecting the ICAO to issue best practice guidance on mitigations for non-CO2 effects[101].

10.6.25 While it is acknowledged that non-CO_2 effects may well have a climate impact, they have not been considered in this assessment. This is on the basis that the impacts could not be adequately quantified due to the level of scientific uncertainty and, in any case, they cannot be contextualised given that there is no international framework for considering them and current policy and emission targets do not include them.

10.7 Quantification of GHG emissions

10.7.1 This section supersedes information provided in **Section 17.10** of the original ES, except where noted in the sub-sections below.

10.7.2 This section summarises the predicted GHG emissions in the 'With Development' case where 12 mppa is reached in the 2030 Core Case growth estimate. Emissions are compared relative to the 2017 baseline, to show the increase in emissions from all operations at Bristol Airport. Emissions are also compared relative to the 'Without Development' case, where capacity is 10 mppa, to show emissions associated with the Proposed Development only.

10.7.3 The information in this section is used to inform the assessment of effects in **Overall predicted** effect of GHG emissions associated with the Proposed Development**8**

10.7.4 Full assessment results are found in **Appendix 10A** of the ES Addendum.

Total emissions

10.7.5 Projected GHG emissions for the baseline case, 'Without Development' and 'With Development' cases for the assessment years 2024, 2030, 2040 and 2050 in three future scenarios (upper emission, central emission and lower emission scenarios) (see **Appendix 10A**) are shown in **Table 10.5**.

Table 10.5 Total GHG emissions ($ktCO_2e/yr$) in the 2017 baseline, 'Without Development' and 'With Development' cases in the upper, central and lower emission scenarios, when offsetting commitments have not been considered.

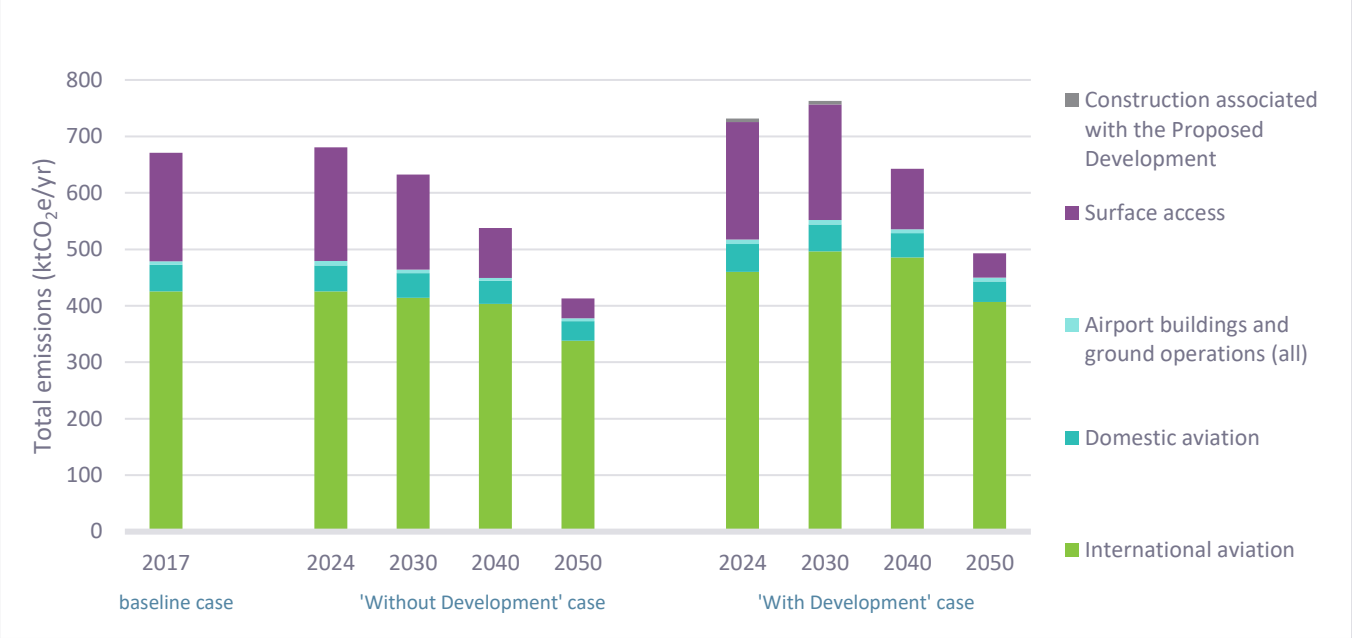
		2024		2030		2040		2050	
	2017 baseline*	Without development	With development	Without development	With development	Without development	With development	Without development	With development
Upper emission scenario		684.93	736.03	645.69	779.10	615.01	735.96	555.77	655.12
Central emission scenario	670.76	680.64	731.41	632.54	763.03	532.83	636.53	405.44	483.63
Lower emission scenario		677.26	721.98	592.01	714.08	461.48	549.93	355..45	423.05

*2017 baseline is based on actual data and therefore no future scenarios were applied to the data. Note no data was available on tenant emissions in 2017.
Total emissions cover all aviation emissions (domestic and international), surface access emissions (passengers and employees), airport building and ground operation and construction emissions associated with the Proposed Development only (assuming a construction period from 2022-2030).

10.7.6 A breakdown of total projected GHG emissions by source for the central emission scenario are shown in **Figure 10.1.** This illustrates the overall GHGs associated with Bristol Airport in the 2017 baseline, 'Without Development' and 'With Development' cases. Equivalent representations for the upper and lower emission scenarios are shown in **Appendix 10A** of the ES Addendum. A summary of the results is provided below.

10.7.7 The methodological developments, including more detailed fleet compositions and improved representation of fuel burn from the newest generation of aircraft, account for a large amount of the reduction in total GHG emissions compared to the original ES. The remainder of the difference relates to the correction described in **Section 10.6**, sub-section **Methodology for quantifying aviation GHG emissions.**

Figure 10.1 Total GHG emissions for the 2017 baseline, and 'Without Development' and 'With Development' cases for the central emission scenario when offsetting commitments are not considered.



Note: 2017 baseline data on airport buildings and ground operations only includes emissions within Bristol Airport's direct control. Tenant information is included in the 'Without Development' and 'With Development' case in the future assessment years. Aviation emissions are by convention reported as CO_2 emissions[132]. This reflects the uncertainties associated with non-CO_2 emissions (see Section 10.6). 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 ton of CO_2 is equal to 1 ton of CO_{2e} and hence no conversion is needed to sum together these emission sources.

10.7.8 Total GHG emissions associated with the 'With Development' case, relative to the 2017 baseline, describes the impact of all future activity at Bristol Airport including the emissions associated with the Proposed Development. Relative to 2017 baseline, GHG emissions in the 'With Development' case increase in all future scenarios in the assessment years 2024 and 2030, prior to falling in assessment years 2040 and 2050.

10.7.9 In 2050, total GHG emissions in the 'With Development' case are below 2017 baseline values in all future scenarios. In 2050, total GHG emissions from the 'With Development' case are 5.64 – 247.72 $ktCO_2e/yr$ lower than the 2017 baseline case. This represents a 1 – 37% reduction in total GHG emissions in the 'With Development' case relative to the 2017 baseline.

10.7.10 GHG emissions in the 'With Development' case peak in the 2030 Assessment Year in all future scenarios. This is primarily due to the fact that aviation and passenger forecasts for the Proposed Development are assumed to be constant beyond 2030 while efficiency improvements (see **Section 10.6** of the ES Addendum) continue. At their peak in 2030, total GHG emissions associated with the 'With Development' case are 43.32 – 108.34 $ktCO_{2e}/yr$ higher compared to the 2017 baseline, dependent on the future scenario considered.

10.7.11 The difference in total 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 Development only. Comparison of the Proposed Development case to the 2017

[132] 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].

baseline describes the relative impact of the Proposed Development in the context of current activities at Bristol Airport.

10.7.12 GHG emissions from the Proposed Development itself (i.e. the difference between the 'With Development' and 'Without Development' cases) peak in 2030 at 122.07 – 133.41 $ktCO_{2e}$/yr, equivalent to a 18 – 20% increase in total GHG emissions relative to the 2017 baseline.

10.7.13 In 2050, total GHG emissions from the Proposed Development are 67.60 – 109.35 $ktCO_{2e}$/yr depending on the future scenario considered. This represents a 10 – 16% increase in total GHG emissions relative to the 2017 baseline before any offsets are applied.

Bristol Airport's offsetting commitment

10.7.14 BAL has committed to offsetting GHG emissions through carbon reduction credits as part of its pathway to carbon neutrality in 2025 and an ambition to become a net zero airport in 2050. The following offsetting commitments have been embedded into additional GHG calculations:

- Offsetting of all passenger journeys to and from the airport by road from 2020;
- Sourcing of a renewable energy electricity supply from 2019, shown as the reduction in GHG emissions between the location-based and market-based approaches for reporting, as described in **Appendix 10A**; and
- Offsetting of all residual direct Scope 1 and 2 GHG emissions from 2025[133].

10.7.15 Residual GHG emissions (i.e. those remaining after the offsetting is applied) for the 'Without Development' and 'With Development' cases for the assessment years 2024, 2030, 2040 and 2050 in three scenarios (upper emission, central emission and lower emission scenarios) are shown in **Table 10.6.**

Table 10.6 Residual GHG emissions ($ktCO_{2e}$/yr) in the 'Without Development' and 'With Development' cases in the upper, central and lower emission scenarios, considering offsetting commitments made by Bristol Airport.

		2024		2030		2040		2050	
	2017 baseline*	Without development	With development	Without development	With development	Without development	With development	Without development	With development
Upper emission scenario		490.89	535.26	471.91	567.71	463.48	551.60	417.95	497.47
Central emission scenario	670.76	486.90	530.94	465.58	560.10	449.37	535.00	375.51	446.72
Lower emission scenario		488.37	526.54	456.86	549.59	435.81	518.30	350.31	416.51

[133] Note that quantification of GHGs has not been presented in terms of Scope 1, 2 and 3, as per the GHG Protocol, because these scopes do not correlate with the magnitude tests that are relevant to the aviation planning context.

*2017 baseline is based on actual data and therefore no future scenarios were applied to the data. Note no data was available on tenant emissions in 2017. No offsetting occurred in 2017 and this data is therefore shown for context only.
Residual emissions cover all aviation emissions (domestic and international), surface access emissions not covered by offsetting commitments (rail passengers and employees), airport building and ground operation not covered by offsetting commitments (everything except renewable electricity in 2024 assessment year, tenant emissions only in assessment years 2030 – 2050) and construction emissions associated with the Proposed Development only.

10.7.16 The breakdown of residual GHG emissions, once offsetting has been considered, by source for the central emission scenario are shown in **Figure 10.2**. Equivalent representations for the upper and lower emission scenarios are shown in **Appendix 10A** of the ES Addendum. A summary of the results is provided below.

Figure 10.2 Residual GHG emissions for the 2017 baseline, and the 'With Development' and 'Without Development' cases for the central emission scenario once offsetting commitments have been accounted for

10.7.17 Relative to the 2017 baseline, residual GHG emissions in the 'With Development' case decrease in all Assessment Years and future scenarios. It should be noted that the sourcing of renewable electricity supply and offsetting of surface access GHG emissions are, as of 2019 and 2020 respectively, already in place so this effect is primarily as a result of the baseline being taken as 2017.

10.7.18 At their peak in 2030, residual GHG emissions in the 'With Development' case are 103.05 – 121.17 $ktCO_{2e}$/yr lower than the 2017 baseline, dependent on the future scenario considered.

10.7.19 In 2050, residual GHG emissions from the 'With Development' case are 173.30 – 254.25 $ktCO_{2e}$/yr lower than the 2017 baseline case. This represents a 26 – 28% reduction in residual GHG emissions in the 'With Development' case once offsetting commitments are considered relative to the 2017 baseline.

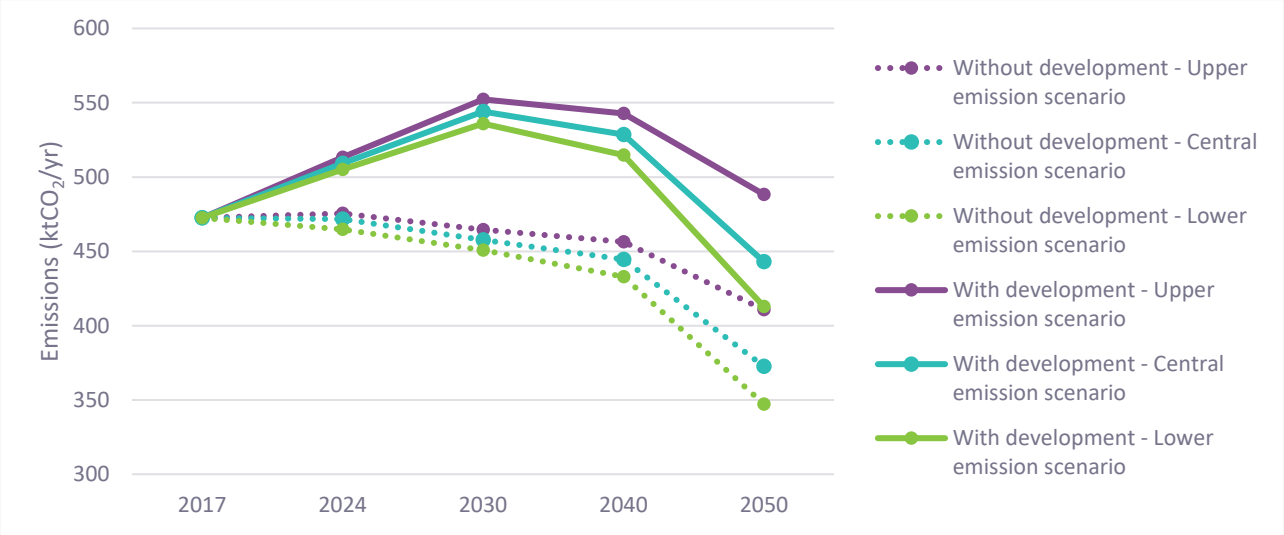
10.7.20 Residual GHG emissions from the Proposed Development itself (i.e. the difference between the 'With Development' and 'Without Development' cases) peak in 2030 at 92.73 – 95.80 $ktCO_{2e}$/yr (see **Appendix 10A**).

10.7.21 In 2050, residual GHG emissions from the Proposed Development are 66.20 – 79.52 $ktCO_{2e}$/yr depending on the future scenario considered (see **Appendix 10A**).

Aviation emissions

10.7.22 Total projected aviation GHG emissions from Bristol Airport for the baseline, 'Without Development' and 'With Development' cases for the Assessment Years 2024, 2030, 2040 and 2050 in three future scenarios (upper, central and lower emissions scenarios) are shown in **Figure 10.3** (see **Appendix 10A** for associated data, including splits for domestic and international aviation). Note that no 'next generation' aircraft beyond the current Airbus NEO and Boeing MAX classes are considered in the aircraft forecasts. Therefore, the longer-term GHG emissions projections are likely to be conservative.

Figure 10.3 Total aviation GHG emission forecasts (international and domestic aviation sources) for the 'Without Development' case (dashed line) and 'With Development' case (solid line) in all future improvement emission scenarios.



10.7.23 Relative to 2017 baseline, aviation GHG emissions in the 'With Development' case are higher in all scenarios for all assessment years up to 2040. Aviation GHG in the 'With Development' case peak in 2030 before decreasing in 2040 and 2050.

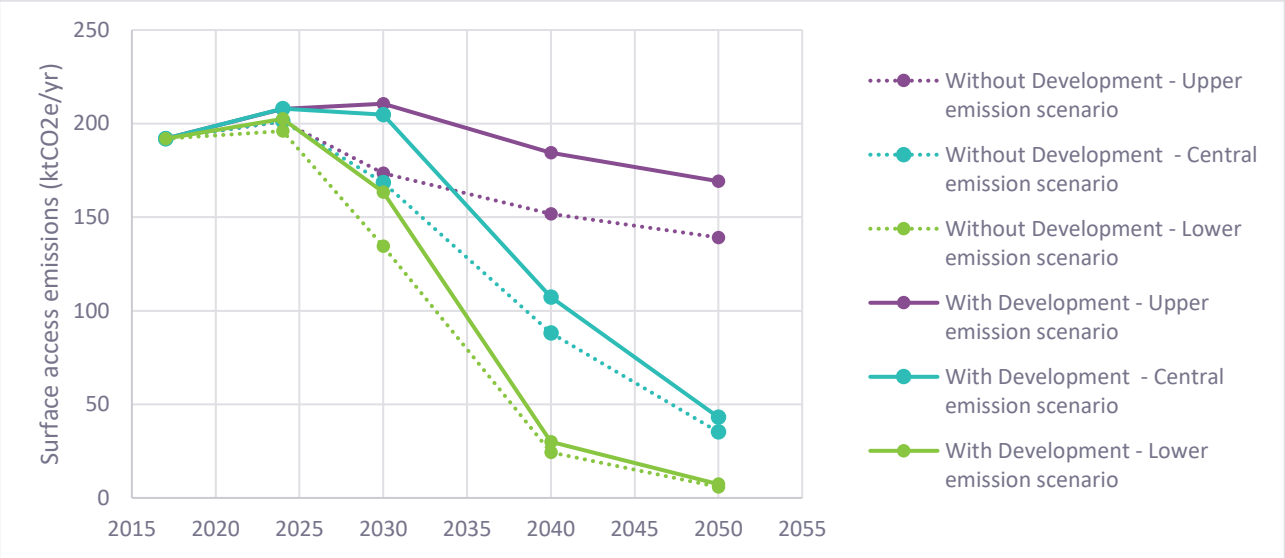
10.7.24 In 2050, total aviation GHG emissions in the 'With Development' case are similar to 2017 baseline values in the upper emission scenario. The differences between the scenarios are as follows:

- Under the upper emissions scenario, 2050 total aviation GHG emissions are 488.29 $ktCO_2/yr$, an **increase of 15.83 $ktCO_2/yr$** (equivalent to a 3% rise in total aviation GHG emissions), relative to 2017 baseline conditions.
- Under the central emissions scenario, 2050 total aviation GHG emissions are 443.01 $ktCO_2/yr$, a **decrease of 29.45 $ktCO_2/yr$** compared to the 2017 baseline. This represents a decrease of 6%.
- Under the lower emissions scenario, 2050 total aviation GHG emissions are 412.85 $ktCO_2/yr$, a **decrease of 59.60 $ktCO_2/yr$** compared to the 2017 baseline. This represents a decrease of 13%.

Surface access emissions

10.7.25 Projected surface access GHG emissions for the 2017 baseline, 'Without Development' and 'With Development' cases for the assessment years 2024, 2030, 2040 and 2050 in three future scenarios (upper emission, central emission and lower emission scenarios) are shown in **Figure 10.4.**

Figure 10.4 Surface access GHG emission forecasts (passenger and staff) for the 'Without Development' case (dashed line) and 'With Development' cases (solid line) in all future improvement emission scenarios, not considering offsetting commitments.



10.7.26 Surface access GHG emissions associated with the 'With Development' case, relative to the 2017 baseline, describes the impact of future surface access activities by passengers and staff at Bristol Airport including the surface access emissions associated with the Proposed Development. Relative to the 2017 baseline, surface access GHG emissions in the 'With Development' case initially increase in all future scenarios. A peak is reached in 2030 in the upper emission scenario and in 2024 in the central and lower emission scenarios. All projections then decrease to below 2017 baseline values by 2050. This is due to anticipated market trends regarding uptake of electric vehicles and efficiency improvements in transport modes (see **Section 10.6** and **Appendix 10A** of the ES Addendum) that have been embedded into the GHG assessment.

10.7.27 In 2050, surface access GHG emissions in the 'With Development' case are reduced compared to the 2017 baseline value in all future improvement emissions scenarios. In 2050, surface access GHG emissions from the 'With Development' case are 7.4 – 169.2 $ktCO_{2e}$/yr. This represents a 22.7 – 184.5 $ktCO_{2e}$/yr reduction relative to the 2017 baseline. The difference between the scenarios is due to the relative lack of low/zero carbon cars in the upper emissions scenario (see **Appendix 10A** of the ES Addendum). Modal shifts to increased public transport are modelled until 2030. Further reductions in future years would also be expected, so the actual GHG emissions presented for 2040 and 2050 are likely to be conservative.

Bristol Airport's offsetting commitment

10.7.28 BAL is committed to influencing GHG emissions that are not within its direct control and has committed to offsetting all passenger journeys by road to and from the airport. Residual GHG emissions from surface access are therefore only passenger rail journeys and staff journeys.

10.7.29 Residual GHG emissions for the 'Without Development' and 'With Development' cases for the assessment years 2024, 2030, 2040 and 2050 in three scenarios (upper emission, central emission and lower emission scenarios) are shown in **Figure 10.5**.

Figure 10.5 Residual surface access GHG emission forecasts (passenger and staff) for the 'Without Development' case (dashed line) and 'With Development' cases (solid line) in all future improvement emission scenarios, considering offsetting commitments from 2020 to 2050.

10.7.30 Due to Bristol Airport's offsetting commitment for surface access, residual surface access GHG emissions are reduced in all future assessment years and future scenarios relative to the total GHG emissions prior to offsetting commitments.

10.7.31 Relative to 2017 baseline, residual surface access GHG emissions in the 'With Development' case decrease in all assessment years and future scenarios.

10.7.32 In 2050, residual surface access emissions from the 'With Development' case reduce substantially to 3.18 – 11.56 $ktCO_{2e}$/yr across the three scenarios. This represents a 94 – 98% reduction in surface access GHG emissions relative to the 2017 baseline, when surface access offsetting was not in place.

10.7.33 The total GHG emissions being offset reduces in future years as increasing amounts of low/zero carbon cars enter into the overall mix of vehicles.

Airport buildings and ground operations

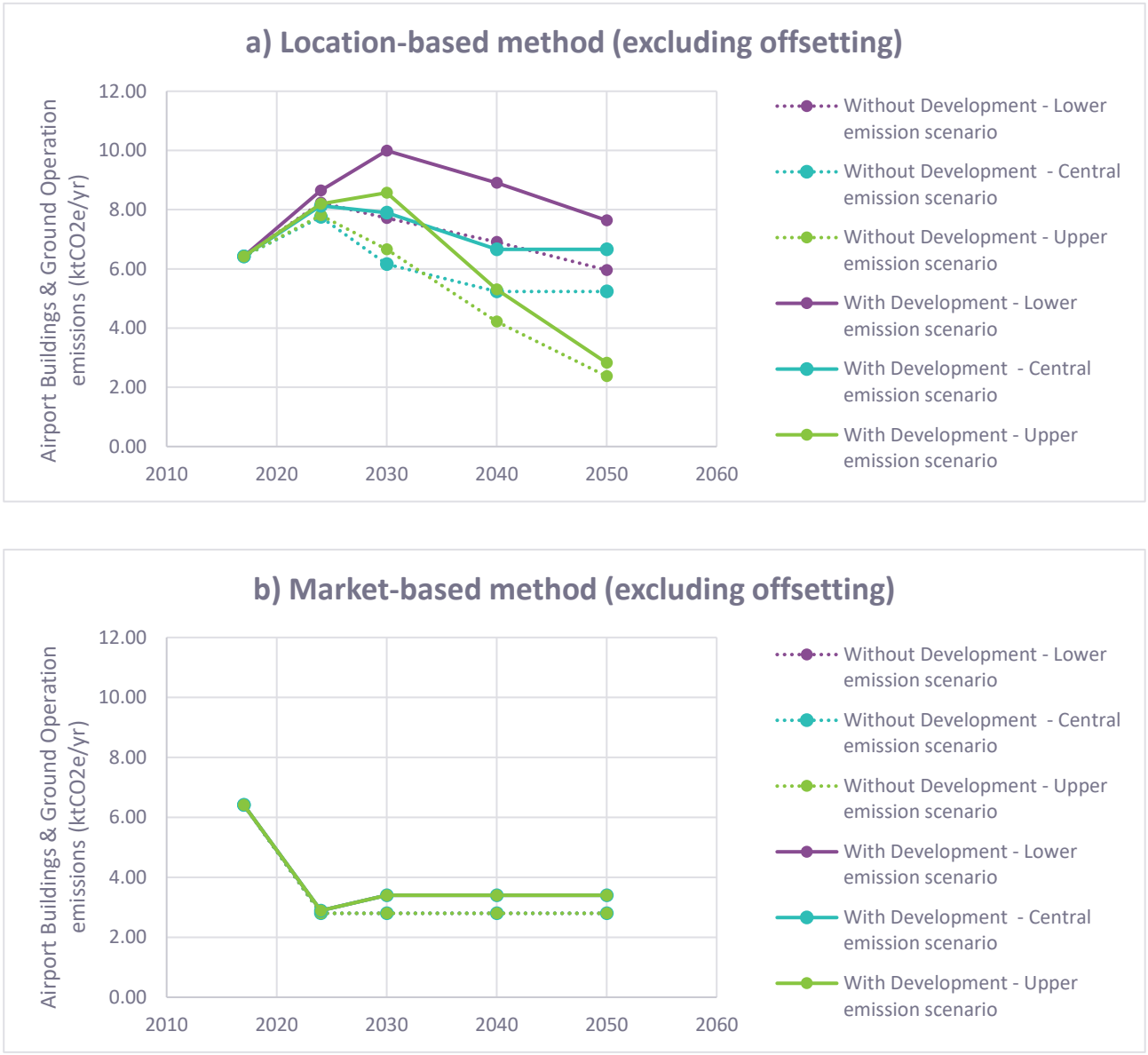
10.7.34 In line with the GHG protocol[134] and BEIS guidance[114], and as described in **Methodology for quantifying airport buildings and ground operations GHG emissions** in **Appendix 10A**, both location-based and market-based carbon reporting methods have been used to calculate projected GHG emissions associated with Scope 2 electricity. Baseline and projected airport building and ground operation GHG emissions are shown in **Figure 10.6**. Data is available in **Appendix 10A** of the ES Addendum.

10.7.35 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

[134] Greenhouse Gas Protocol. (2015). GHG Protocol Scope 2 Guidance. An amendment to the GHG Protocol Corporate Standard [online]. Available at https://www.ghgprotocol.org/sites/default/files/ghgp/standards/Scope%202%20Guidance_Final_0.pdf [Accessed 21 October 2020].

sources that has been purposefully chosen at Bristol Airport (see **Appendix 10A** of the ES Addendum).

Figure 10.6 Total airport building and ground operation GHG emissions forecasts for the 'Without Development' case (dashed line) and 'With Development' case (solid line) in all future improve emission scenarios, considering offsetting commitments: (a) location-based method and (b) market-based method for reporting



10.7.36 Relative to the 2017 baseline, airport building and ground operation GHG emissions in the 'With Development' case increase to 2030 in all scenarios when the location-based method is considered, and decrease in all future scenarios when the market-based method is considered.

10.7.37 Using the location-based method, in 2050, airport building and ground operation GHG emissions from the 'With Development' case are 2.83 – 7.64 $ktCO_{2e}$/yr. The upper emission scenario shows an increase in airport building and ground operation emissions by 1.22 $ktCO_{2e}$/yr, a 19% increase, relative to 2017 baseline. The central emission scenario is similar to the 2017 baseline with a 0.24 $ktCO_{2e}$/yr increase, a 4% increase, relative to 2017 baseline. The lower emission scenario shows a

decrease in airport building and ground operation emissions relative to 2017 baseline by 3.59 $ktCO_{2e}$/yr, a 56% decrease.

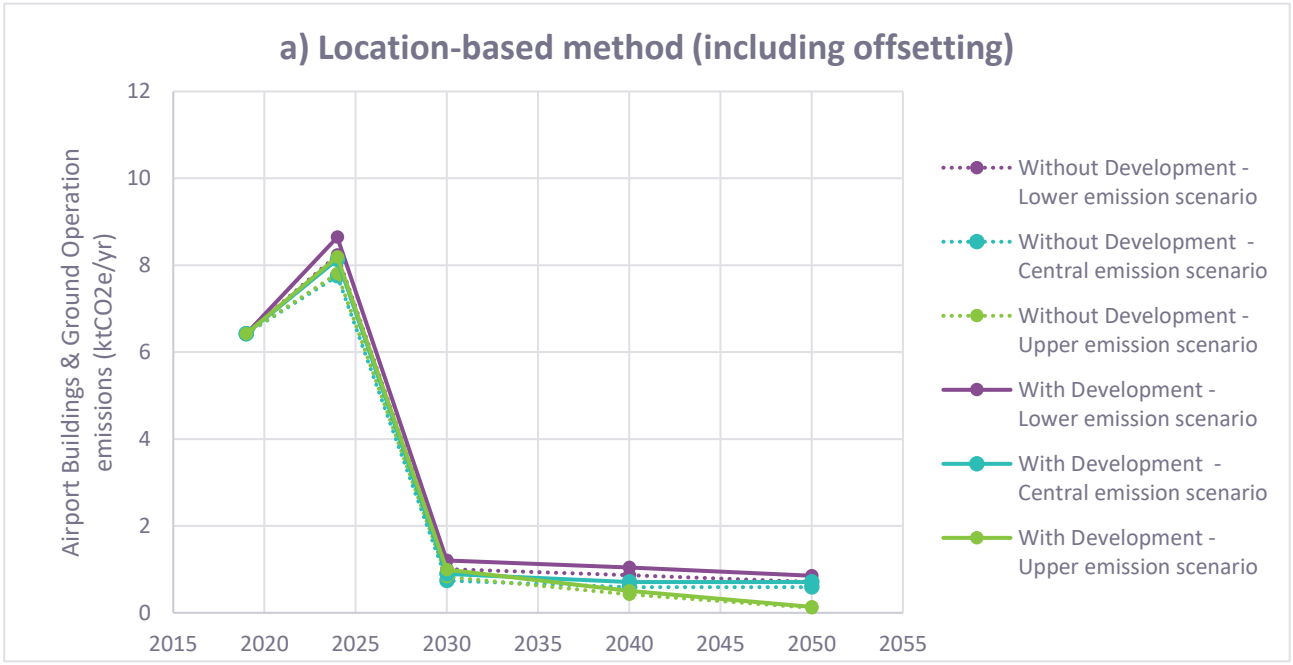
10.7.38 Using the market-based method, in 2050, airport building and ground operation GHG emissions from the 'With Development' case are 3.40 $ktCO_{2e}$/yr. This represents a 3.02 $ktCO_{2e}$/yr reduction in GHG emissions relative to 2017 baseline.

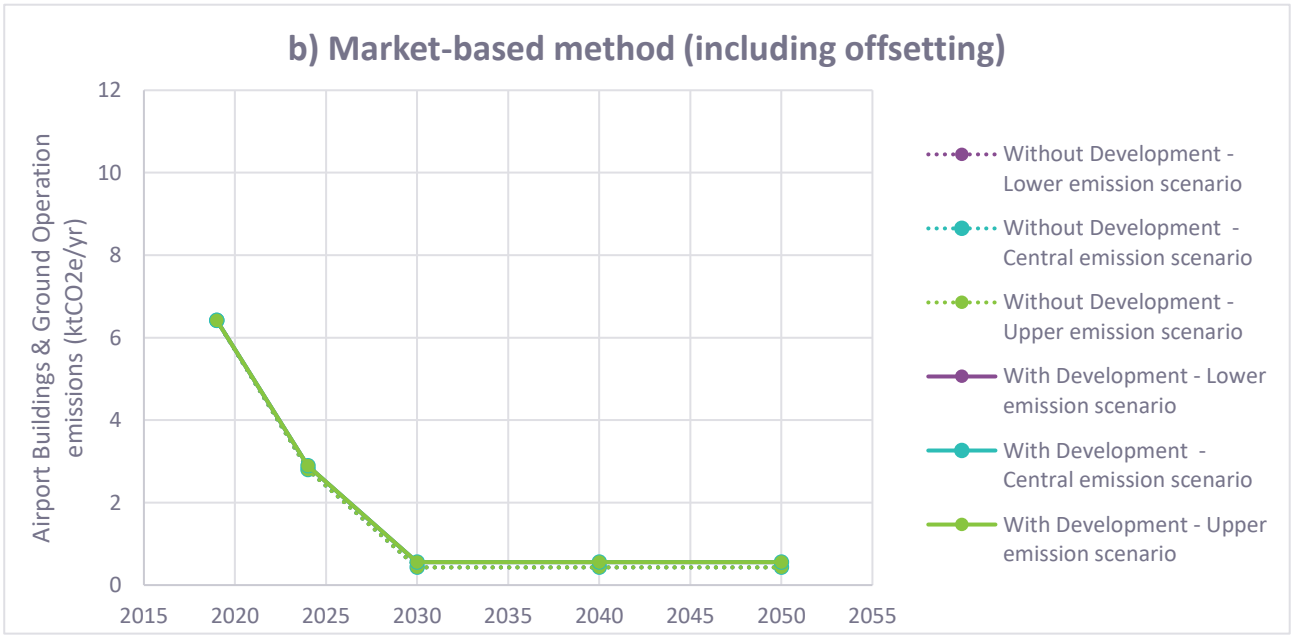
Bristol Airport's offsetting commitment

10.7.39 BAL has committed to be carbon neutral by 2025 for Scope 1 and Scope 2 GHG emissions through its Carbon Roadmap[82], published in July 2019. As described in **Section 10.4**, this will be achieved through offsetting of residual direct Scope 1 and 2 GHG emissions through certified carbon reduction credits from 2025.

10.7.40 Residual GHG emissions from airport building and ground operations in 2030 – 2050 scenarios therefore only relate to tenant gas use and electricity usage (**Figure 10.7**).

Figure 10.7 Residual airport building and ground operation GHG emissions forecasts for the 'Without Development' case (dashed line) and 'With Development' case (solid line) in all future improve emission scenarios, considering offsetting commitments: (a) location-based method and (b) market-based method for reporting





10.7.41 GHG emissions associated with electricity usage in 2050 are reduced by 92% and 84% in the upper and central emission scenarios respectively, through renewable energy procurement, as calculated in the market-based method relative to the location-based method. Efficiencies assumed in the lower emission scenario for UK grid electricity[120] generation result in negative electricity GHG emissions by 2050. This is therefore higher than the market-based method for calculating electricity GHG emissions.

10.7.42 The commitment to procure a 100% renewable electricity supply and to offset direct Scope 1 and 2 emissions from 2025 substantially reduces residual GHG emissions in all future Assessment Years relative to the 2017 baseline. Using the market-based approach, GHG emissions reduce by 5.86 $ktCO_{2e}$/yr by 2050, equivalent to a 91% reduction relative to 2017 baseline. In the location-based method, GHG emissions in 2050 are reduced by 5.6 to 6.3 $ktCO_{2e}$/yr equivalent to an 87% to 98% reduction relative to 2017 baseline.

Construction emissions

10.7.43 This section updates information provided in **Section 17.10**, sub-section **Predicted effects and their significance**, sub-section **GHG emissions from constructing the Proposed Development** of the original ES. Changes are noted below, all other information provided in the original ES remains valid.

10.7.44 Updated projected GHG emissions from construction phase sources are shown in **Table10.7**. This represents a worst-case scenario, as the measures described in **Table 17.7** of the original ES have not been quantified.

10.7.45 The construction GHG emissions are for the whole construction period, which covers 2022-2029.

Table 10.7 GHG emissions from construction phase

Source	Activity	Proposed Development 2030 (12 mppa) ($ktCO_{2e}$)		
		Upper emission scenario	Central emission scenario	Lower emission scenario
Construction	Construction vehicles (HGVs)		4.26	
	Construction employee vehicles (LGVs)	1.98	1.93	1.76
	Embodied carbon of construction materials		41.32	
	On-site construction processes		2.19	
Total Construction		49.75	49.71	49.54

10.7.46 The majority of assumptions reported in **Section 17.10**, sub-section **Predicted effects and their significance**, sub-section **GHG emissions from constructing the Proposed Development** of the original ES remain valid. On-site construction processes have been estimated as 5.3% of the GHG emissions from embodied carbon using updated assumptions. As described in **Appendix 10A** of the ES Addendum, 2020 emission factors have been used in this assessment to reflect technological advances and efficiency improvements since the original ES which are more representative of the period under which construction activities will occur for the Proposed Development.

10.7.47 As a result of the updated data sources, construction GHG emissions have increased by 1.45 – 1.66 $ktCO_{2e}$. relative to those reported in the original ES, an increase of 3.0 – 3.5%.

10.7.48 There is no construction in the 'Without Development' case, so the GHG emissions are 0 $ktCO_{2e}$.

10.8 Overall predicted effect of GHG emissions associated with the Proposed Development

10.8.1 This section supersedes information provided in Section **17.10** of the original ES.

10.8.2 As described in **Section 10.5** the only receptor for the GHG assessment is the global climate, which is a highly sensitivity receptor. All increases in GHG emissions to the atmosphere are considered negative, direct and permanent effects.

10.8.3 The magnitude of the GHG emissions from the Proposed Development is assessed based on the tests described in **Section 10.6**, sub-section **Methodology for assessing overall effect of GHG emissions associated with the Proposed Development.**

International Aviation

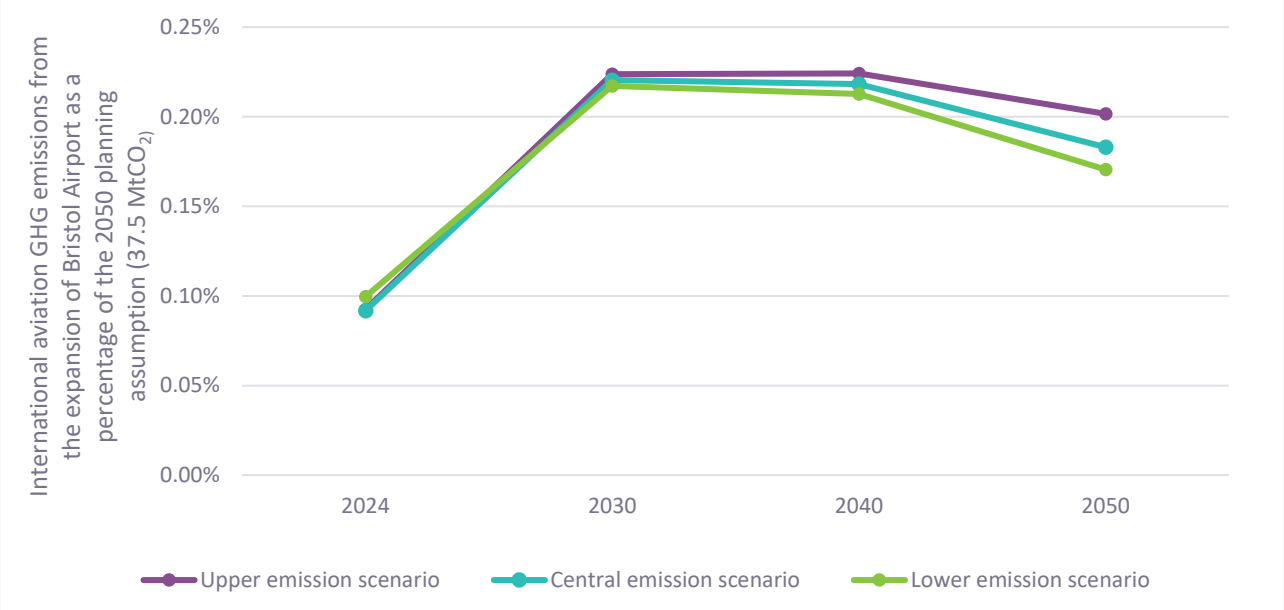
10.8.4 This sub-section considers the following magnitude test:

The extent to which the scheme materially affects the ability of the UK to meet the aviation 'planning assumption'. *The scale of international aviation GHG emissions in the 'With Development' case is contextualised within the current UK 'planning assumption' for international aviation of 37.5 $MtCO_2$[86]. The CCC 'Further Ambition' value for GHG emissions from international aviation of 30 $MtCO_2$[87], which is not current Government policy, is also considered as a sensitivity assessment.*

International aviation GHG emissions from the Proposed Development

10.8.5 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 Development only. The additional international aviation GHG emissions associated with the Proposed Development (i.e. expanding from 10 to 12 mppa) as a percentage of 37.5 $MtCO_2$/yr are shown in **Figure 10.8**.

Figure 10.8 International aviation GHG emissions from the expansion of Bristol Airport (i.e. the Proposed Development only) as a proportion of the 37.5 $MtCO_2$/yr planning assumption.



10.8.6 At their peak in 2030 under all scenarios, the international GHG emissions associated with the Proposed Development itself are projected to equate to 0.22% of the 37.5 $MtCO_2/yr$[86]. This reduces to 0.17 – 0.20% in 2050.

International aviation GHG emissions from the whole airport

10.8.7 Baseline international aviation GHG emissions from flights departing the UK in 2017 are 36.3 $MtCO_2/yr$[126]. In the 2017 baseline, international aviation emissions from Bristol Airport as a whole (0.43 $MtCO_2$) represented 1.17% of that UK total.

10.8.8 Dependent on the scenario used, total international aviation emissions from Bristol Airport in the 'With Development' case in 2050 represent 1.01 – 1.20% of the 'planning assumption' (37.5 $MtCO_2$) (**Figure 10.9**). Therefore, it can be determined that the share of emissions from Bristol Airport will be unlikely to increase and therefore is unlikely to materially affect the ability of the UK to meet the 'planning assumption'[135].

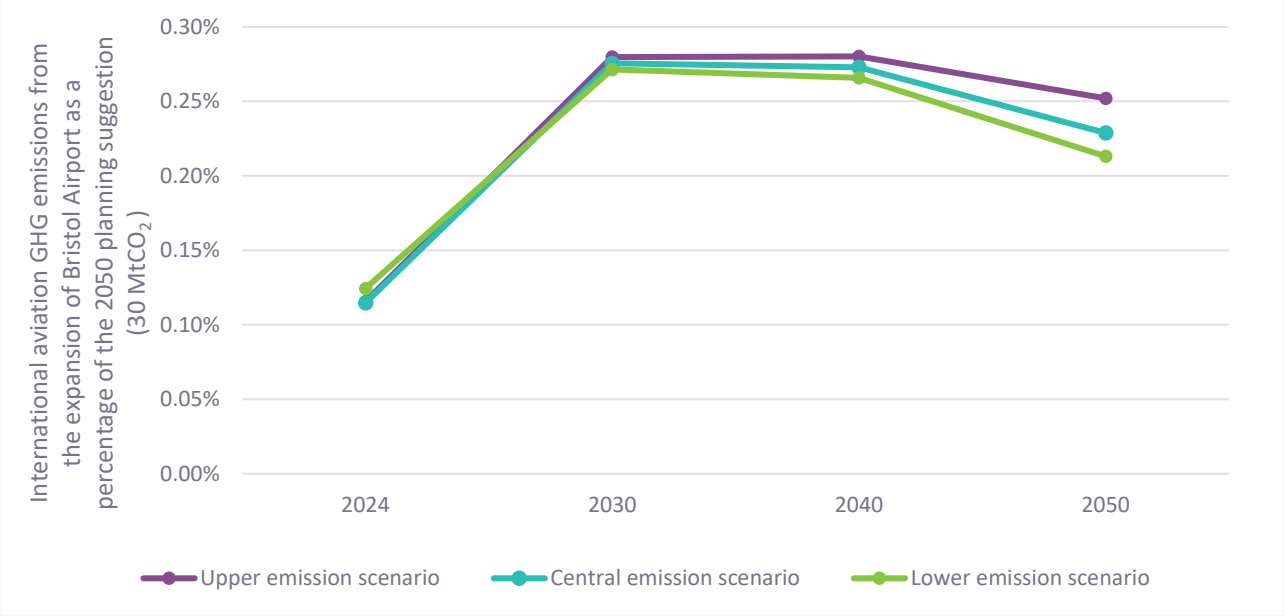
Figure 10.9 International aviation GHG emissions from the 'With Development' case, representing all international aviation emissions from an expanded Bristol Airport (including the Proposed Development) as a 'share' of the 37.5 $MtCO_2/yr$ planning assumption. Bristol Airport's 'share' of actual baseline international aviation GHG emissions from flights departing the UK in 2017 is shown for reference.

Sensitivity analysis

10.8.9 The international aviation GHG emissions associated with the Proposed Development as a percentage of 30 $MtCO_2/yr$ suggestion[87] are shown in **Figure 10.10**.

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

Figure 10.10 International aviation GHG emissions from the expansion of Bristol Airport (i.e. the Proposed Development only) as a proportion of the 30 $MtCO_2$/yr planning suggestion.

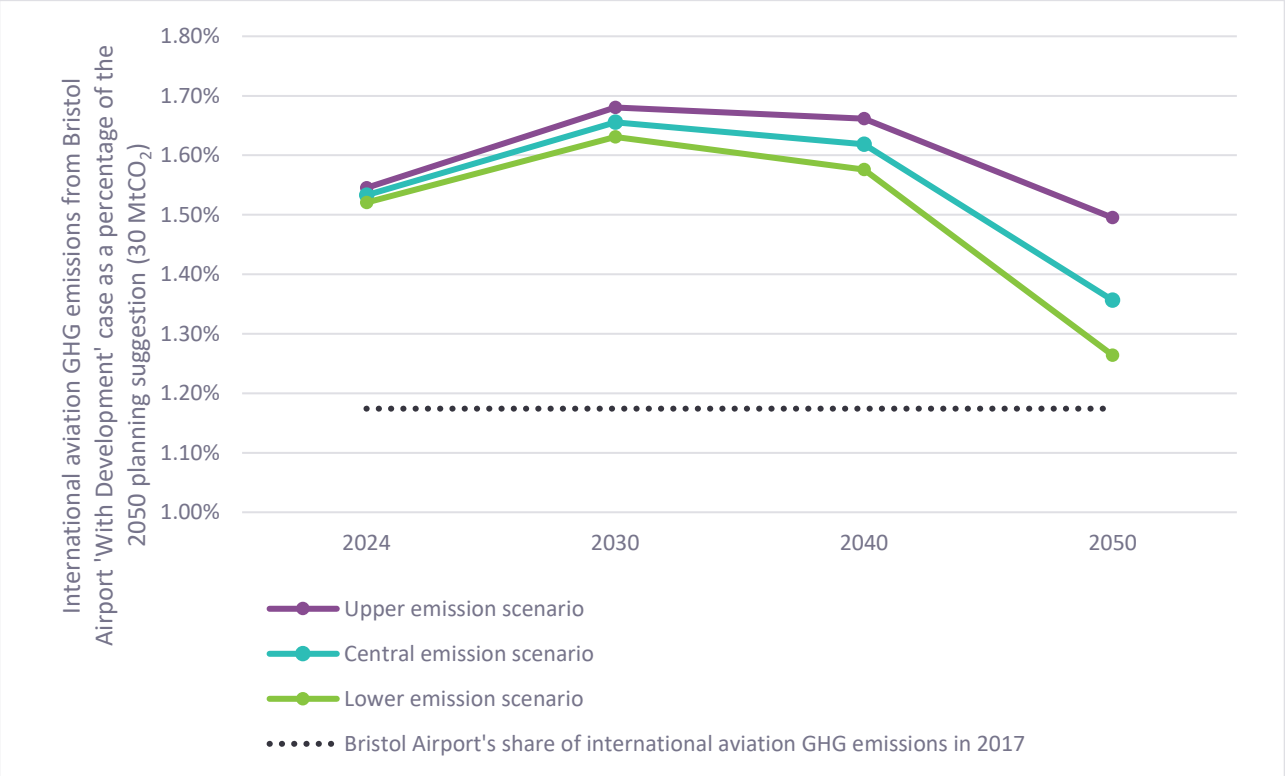


10.8.10 International aviation GHG emissions associated with the Proposed Development itself peak in the upper emission scenario in 2040, at which point they are projected to equate to 0.28% of the 30 $MtCO_2$/yr suggestion. The central and lower emission scenario peak in 2030 at 0.28% and 0.27% respectively of the suggestion. This reduces to 0.21 – 0.25% in 2050, dependent on the scenario used.

10.8.11 In the 2017 baseline, international aviation emissions from Bristol Airport *as a whole* represented 1.17% of the UK total for international aviation GHG emissions from flights departing the UK.

10.8.12 Dependent on the scenario used, total international aviation emissions from Bristol Airport in the 'With Development' case in 2050 represent 1.26 – 1.50% of the 30 $MtCO_2$ suggestion that the CCC use in their Further Ambition scenario[87] (**Figure 10.11**, see **Appendix 10A** of the ES Addendum). Therefore, it can be determined that the share of emissions from Bristol Airport is likely to increase if the 30 $MtCO_2$/yr suggestion was brought into policy.

Figure 10.11 International aviation GHG emissions from the 'With Development' case, representing all international aviation emissions from an expanded Bristol Airport (including the Proposed Development) as a 'share' of the 30 $MtCO_2$/yr planning suggestion. Bristol Airport's 'share' of actual baseline international aviation GHG emissions from flights departing the UK in 2017 is shown for reference.



10.8.13 If the 'planning assumption' used for international aviation in setting UK carbon budgets were to be reduced, then further policy measures and mechanisms would need to be put in place by the UK Government to assist with GHG emission reductions across the aviation sector. These measures are beyond BAL's control but would need to be taken into account when considering the extent to which the Proposed Development materially affects the Government's ability to achieve any such future policy position. That is, a further scenario reflecting those new policy measures and mechanisms would need to be assessed against any such new headroom.

Summary

10.8.14 Given that there is a projected increase in GHG emissions compared to the 'Without Development' case, there is a residual adverse impact on the global climate. However, as the Proposed Development represents only 0.17-0.20% of the 37.5 $MtCO_2$/yr 'planning assumption', and Bristol Airport's total share of UK international aviation GHG emissions in the 2050 planning assumption is similar to, or less than, the 2017 baseline, it is unlikely that the Proposed Development will materially affect the ability of the UK to meet the 37.5 $MtCO_2$/yr 'planning assumption'.

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

10.8.15 This sub-section considers the following magnitude test:

The extent to which the scheme affects the ability of the UK to meet its target and budgets. *The scale of the GHG emissions from all sources except international aviation in the 'With Development' case is contextualised within their overall impact on the UK Government's UK carbon target of 'net zero' in 2050 and UK carbon budgets[84]. The scale of the GHG emissions from all sources except aviation in the 'With Development' case is also considered within the context of local objectives*

for reducing GHG emissions. Therefore, the extent to which the Proposed Development affects the ability of North Somerset Council to meet its climate change objectives for a carbon neutral area by 2030[98] is taken into account. However, as the local objectives are not yet part of local planning policy, they are not given the same weight as the national Net Zero target[84] and the associated budgets[85].

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

- Airport buildings and ground operations;
- Surface access;
- Domestic aviation (Landing and Take-Off (LTO) and CCD); and
- Construction.

10.8.17 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 Development only. **Figure 10.12** shows the projected GHG emissions associated with the Proposed Development only that are considered in the UK Carbon Target[84] and UK Carbon Budgets[85]. Both the total emissions and residual emissions following offsetting commitments are shown.

10.8.18 At the peak in 2030, GHG emissions for this magnitude test are 40.63 - 49.49 $ktCO_{2e}$/yr depending on the future scenario considered, when offsetting is not considered. When offsetting is considered, GHG emissions peak in 2030 at 11.29 - 11.89 $ktCO_{2e}$/yr.

Figure 10.12 Absolute GHG emissions (solid line) and residual GHG emissions once offsetting commitments are considered (dashed line) which contribute to the UK Carbon Target and UK Carbon Budgets from the Proposed Development only (i.e. the difference between the 'with development' and 'without development' cases.

10.8.19 In 2050, GHG emissions from the Proposed Development that are considered in the UK Net Zero 2050 Target are 3.65 - 33.72 $ktCO_{2e}$/yr, dependent on the future scenario used. Residual GHG emissions once offsetting commitments have been considered reduce to 2.93 – 7.51 $ktCO_{2e}$/yr, dependent on the scenario used.

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

- Domestic aviation GHG emissions. These emissions are within the EU ETS[88] and will be within the UK ETS[91] from 2021 onwards.
- Public transport and staff GHG emissions to and from the airport. Reducing these emissions requires a coordinated approach with local authorities. The difference between the with and without offsetting is almost entirely surface access GHG emissions, which peak in 2030 as the transition to low carbon vehicles accelerates thereafter.
- Tenant electricity and gas use.
- A small amount of energy related to electricity transmission that remains in the bought renewable electricity factor.

10.8.21 2024 GHG emissions are assumed to be representative of the fourth carbon budget period (2023-2027)[85]. The total carbon budget for the UK in this period is 1950000 $ktCO_{2e}$/yr. The percentage of this budget associated with the Proposed Development is:

- 0.0041 - 0.0042% when offsetting is not considered; and
- 0.0024 – 0.0025% when offsetting is considered.

10.8.22 2030 GHG emissions are assumed to be representative of the fifth carbon budget period (2028-2032)[85]. The total carbon budget for the UK in this period is 1725000 $ktCO_{2e}$/yr. The percentage of this budget associated with the Proposed Development is:

- 0.0118 - 0.0143% when offsetting is not considered; and
- 0.0033 – 0.0034% when offsetting is considered.

10.8.23 The North Somerset Climate Emergency Strategy[98] aims for a carbon neutral area by 2030. To date, this is an aim rather than a policy and the scope of this aim has not yet been defined. In 2030, GHG emissions described above are 36.95 – 45.71 $ktCO_{2e}$/yr when offsetting is not considered. Residual GHG emissions once offsetting is considered reduce the GHG emission to 7.62 – 8.10 $ktCO_{2e}$/yr in 2030 depending on the scenario considered (see **Appendix 10A**).

10.8.24 The residual GHG emissions from airport buildings and operations assessment relate to Scope 3 emissions and are therefore not covered by Bristol Airport's 2025 carbon neutral commitment or the net zero 2050 ambition. The approach by which BAL will influence the reduction of these GHG emissions is set out in **Section 10.9**. The residual GHG emissions from domestic aviation and journeys to and from the airport not covered by the offsetting commitment (i.e. public transport journeys) will also require the action of third parties at a local and national scale, which BAL will influence (see **Section 10.9**).

Summary

10.8.25 On the basis of the commitment to becoming a carbon neutral airport by 2025 in the Bristol Airport Carbon Roadmap[82], and the further actions to reduce Scope 3 emissions as detailed in **Section 10.9**, the scale of GHG emissions from the Proposed Development are such that they will have a negligible effect on the ability of the UK to meet its carbon targets. Additionally, the scale of non-aviation GHG emissions from the Proposed Development are such that they are unlikely to affect the ability of NSC to meet its carbon neutral area aim, primarily due to the commitment to becoming a carbon neutral airport in 2025 in the Bristol Airport Carbon Roadmap[82].

Faster and Slower Growth Cases

10.8.26 The quantitative assessment presented above has been based on the 2030 Core Case passenger growth estimate (see **Section 3.2** of the ES Addendum). If the 12 mppa is reached in the earlier

year of 2027 (i.e. the Faster Growth Case) or the later year of 2034 (i.e. the Low Growth Case), the trajectory of GHG emissions will vary, but will ultimately reach the same point in 2050 as the central growth estimate. Therefore, the impacts of the Proposed Development will not be substantially different from the 2030 Core Case.

Summary of predicted effects

10.8.27 The overall assessment of effects is based on the sensitivity of the receptor and magnitude of the GHG emissions as described in **Section 10.6**, sub-section **Methodology for assessing overall effect of GHG emissions associated with the Proposed Development**.

10.8.28 The global climate is the largest inter-related cumulative environmental effect[128], so the receptor can be considered highly sensitive. The overall effect of GHG emissions associated with the Proposed Development is based on the magnitude tests set out in **Section 10.6**, sub-section **Methodology for assessing overall effect of GHG emissions associated with the Proposed Development**. An assessment of projected GHG emissions associated with the Proposed Development against these tests is set out in each of the sub-sections in **Section 10.8**. To summarise:

- For international aviation emissions, the 'With Development' case represents 1.01 – 1.20% of the planning assumption for international aviation of 37.5 $MtCO_2$/yr in 2050. This is similar to, or below, Bristol Airport's share of actual baseline international aviation GHG emissions from flights departing the UK in 2017 (1.17%). The GHG emissions associated with the Proposed Development itself are 0.17 – 0.20% of the 37.5 $MtCO_2$/yr planning assumption in 2050
- For all other GHG emissions, residual emissions associated with the Proposed Development (i.e. the increase in emissions between the 'With Development' and 'Without Development' case), once offsetting commitments have been considered, are 2.93 – 7.51 $ktCO_{2e}$/yr in 2050.
- All of the residual emissions are Scope 3, and are thus not under the control of BAL.

10.8.29 The mitigations set out in **Section 10.4** show that the GHG emissions associated with the Proposed Development have been mitigated wherever practicable and are in-line with the UK net zero target.

10.8.30 BAL is committed to annually reporting its GHG emissions through the Annual Monitoring Report[117], which is publicly available, as set out in **Section 10.4**. This is considered appropriate, subject to the additional reporting of progress against mitigation measures as described in **Section 10.9.**

10.8.31 Therefore, the Proposed Development:

- Is unlikely to materially affect the ability of the UK Government to meet the 37.5 $MtCO_2$/yr 'planning assumption' for UK international aviation GHG emissions in 2050[84,85,86].
- Has a negligible effect on the ability of the UK Government to meet its carbon targets for net zero in 2050, as evidenced by BAL's carbon neutral 2025 commitment and the increased focus on GHG emissions reductions (i.e. not relying on offsetting) in the net zero 2050 airport ambition[82].
- Is unlikely to materially affect the ability of NSC to meet its carbon neutral area by 2030 aim[98], as evidenced by BAL's carbon neutral airport 2025 commitment and the offsetting of all passenger surface access GHG emissions by road.
- Is consistent with the NPPF[93] requirement for developments to '*support the transition to a low carbon future in a changing climate',* as evidenced by the carbon neutral commitment and net zero ambition.

- Is in accordance with North Somerset Core Strategy[90] Policy CS1, as the Proposed Development has shown a commitment to reducing GHG emissions and tackling climate change and is actively incorporating renewable energy solutions.
- Is in accordance with North Somerset Core Strategy[90] Policy CS2, as there is a clear commitment to reduction of GHG emissions through the design and construction of new infrastructure within the embedded and additional mitigations, and renewable energy production covers 25% of demand by 2025.
- Is in accordance with North Somerset Core Strategy[90] Policy CS23, as a package of mitigations have been embedded into the application to mitigate GHG emissions associated with the Proposed Development, including offsetting of all passenger surface access GHG emissions from road travel. This is based on the assumption that additional mitigation is put in place to reduce reliance on offsetting and move towards GHG emissions reduction (see **Section 10.9**). Furthermore, there is a small GHG benefit from reducing leakage from the region to other airports in the UK (see **Appendix 10B** of the ES Addendum).

10.8.32 Given the magnitude criteria shown in **Table 10.3**, the Proposed Development is considered to have **a low GHG emissions magnitude**.

10.8.33 Following the approach set out in **Table 10.4**, the overall effect of projected GHGs associated with the Proposed Development on the global climate is considered **minor adverse**, and therefore **not significant.**

10.8.34 This conclusion is therefore consistent with the carbon and other GHG emissions assessment for the original ES, which concluded that the global climate impacts were considered to be not significant for construction, non-aviation operations and aviation emission sources. It should be noted that the contextualisation of emissions has been considered differently in this ES Addendum and the total emissions are substantially lower. Methodological developments, including more detailed fleet compositions and improved representation of fuel burn from the newest generation of aircraft, account for a large amount of the reduction in total GHG emissions compared to the original ES. The remainder of the difference relates to the correction described in **Appendix 9C** of the ES Addendum.

10.8.35 A sensitivity test has been carried out for a lower international aviation GHG emissions 'headroom' of 30 $MtCO_2$ based on the 'Future Ambition' modelling assumptions suggested by the CCC[4] to characterise a potential future state for the sector in a net zero 2050 UK. If such a reduced headroom were implemented by Government, it would be accompanied by policy mechanisms and levers for achieving it at a sector level. At this stage, in the absence of any such policy mechanisms or levers upon which to base an assessment, the extent to which the Proposed Development would materially affect the Government's ability to achieve the lower headroom is considered as a sensitivity test only.

10.9 Additional mitigation

10.9.1 This section supersedes information provided in **Section 17.11** of the original ES.

10.9.2 BAL is committed to annually reporting its GHG emissions through the Annual Monitoring Report[117], which is publicly available.

Carbon and Climate Change Action Plan (CCCAP)

10.9.3 Bristol Airport is producing a Carbon and Climate Change Action Plan (CCCAP) that builds upon the statements made in the Bristol Airport Carbon Roadmap[82], including the ambition to become a net

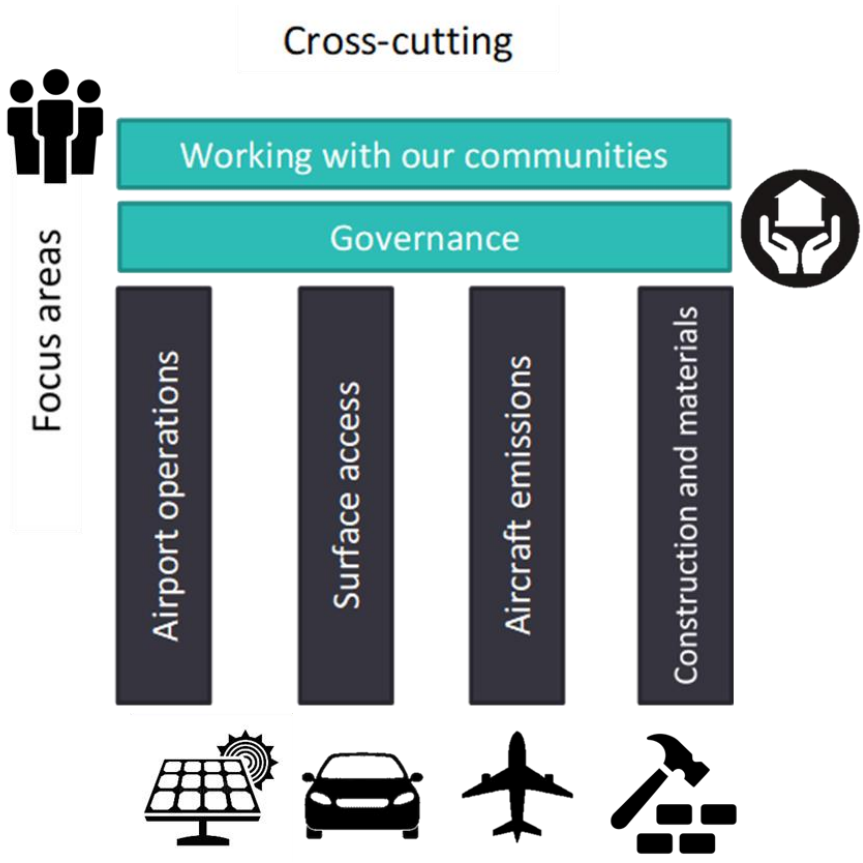
zero airport in 2050 and the commitment to becoming a carbon neutral airport in 2025. The CCCAP is therefore a key document in adding the required detail to the commitments that are used to assess effects in **Overall predicted** effect of GHG emissions associated with the Proposed Development, thus reducing the reliance on offsetting towards GHG emission reduction over time.

10.9.4 The CCCAP will contain the existing mitigations that are embedded into this assessment (e.g. offsetting of surface access GHG emissions) and set out the additional mitigation measures by which the airport will achieve its carbon vision, which is:

"Bristol Airport is committed, as regional leader in carbon management, to being at least a net zero airport for GHG emissions by 2050 and influence, or mitigate where possible, emissions that are not under our direct control."

10.9.5 Mitigations included in the CCCAP have been developed through an extensive internal and external stakeholder process. The CCCAP has four areas of action which link to those reported in this ES Addendum (see **Figure 10.9**). There are also two cross-cutting themes, 'Partnerships and Communities' and 'Governance', which describe the enabling actions required to deliver on the carbon neutral commitment and net zero ambition (**Figure 10.13**).

Figure 10.13 Draft representation of the cross-cutting themes and focus areas in the CCCAP



10.9.6 'Partnerships and Communities' will set out how BAL will listen to, and work, with its partners and communities within the value chain to reduce the GHG impact of the travel benefits the airport provides. It will also describe how BAL is driving innovation through involvement as a leader in aviation, energy and low carbon transport regional schemes/clusters.

10.9.7 'Governance' will set out the internal processes required to maintain the CCCAP, as well as the linkages into local, regional, sectoral and national governance structures pertaining to net zero. It will also describe the key internal stakeholders, the Net Zero working group, policy development, executive board communication processes and a system for ensuring the Bristol Airport vision is reciprocated across the value chain.

10.9.8 As part of the aircraft emissions focus area, an example that has already been committed to is BAL's engagement with the aviation sector. Bristol Airport remains a member of Sustainable Aviation and is actively engaged to reduce associated GHG emissions. It is not possible to estimate the anticipated emission reductions at Bristol Airport associated with engagement and therefore this has not been quantified in the assessment.

10.9.9 The CCCAP will remain a live document and be continually updated against a set of Key Performance Indicators (KPIs) linked to each focus area. The CCCAP will be reviewed and published every 5 years. Note that the CCCAP will also include a section on climate change adaptation and resilience, which is not considered further in this ES Addendum.

10.10 Conclusions

10.10.1 This section supersedes information provided in **Section 17.12** of the original ES; however, **the overall conclusion is unchanged from the original ES**.

10.10.2 The only receptor for the GHG assessment is the global climate, which is a highly sensitivity receptor due to the importance of the issue of climate change. All increases in GHG emissions to the atmosphere are considered negative, direct and permanent effects.

10.10.3 The magnitude of the GHG emissions from the Proposed Development is assessed based on the criteria described in **Section 10.6**.

10.10.4 In the 'With Development' case, Bristol Airport's total share of UK international aviation emissions under the 2050 planning assumption is similar to, or less than, Bristol Airport's total share of UK international aviation emissions in 2017 (**Figure 10.10** International aviation GHG emissions from the expansion of Bristol Airport (i.e. the Proposed Development only) as a proportion of the 30 MtCO2/yr planning suggestion.). The emissions from the Proposed Development itself are only 0.17 – 0.20% of the planning assumption (**Figure 10.8** International aviation GHG emissions from the expansion of Bristol Airport (i.e. the Proposed Development only) as a proportion of the 37.5 MtCO2/yr planning assumption.. Therefore, it is unlikely that the Proposed Development will materially affect the ability of the UK to meet the 37.5 $MtCO_2$/yr planning assumption.

10.10.5 For all other GHG emissions, there is an increase associated with the Proposed Development case (i.e. the 'With Development' case relative to the 'Without Development' case) in 2050, although the vast majority of the GHG emissions relate to surface access, which are offset by BAL. Residual emissions will require reduction by the relevant third parties, with BAL influencing those reductions where practicable through the development of the additional mitigations described in **Section 10.9**. Therefore, GHG emissions from all sources except international aviation are projected to be negligible and thus do not affect the ability of the UK to meet its carbon target for net zero by 2050, as legislated in the Climate Change Act[84].

10.10.6 Given the magnitude criteria shown in **Section 10.6** and assessed in **Section 10.8**, the Proposed Development is considered to have **a low GHG emissions magnitude**.

10.10.7 Following the approach set out in **Section 10.6**, the overall effect of GHGs associated with the Proposed Development on the global climate is considered **minor adverse** and therefore **not significant.**

11. Cumulative Effects Assessment

11.1 Introduction

11.1.1 This chapter of the ES Addendum supplements **Chapter 18: Cumulative Effects Assessment** of the original ES (December 2018) and should be read in conjunction with this.

11.1.2 The original ES concluded (see **Section 18.7**):

"No significant adverse inter-project effects are anticipated from the Proposed Development together with the 'other developments' presented in Appendix 18B and the 10 mppa and GPDO development at Bristol Airport. There is one beneficial inter-project effect of moderate significance on the collective health benefits from employment and investment from the 'other developments' in addition with the Proposed Development. This is reported further in Section 16.11 of Chapter 16: Human Health.

Generally, there are no significant inter-related effects anticipated. The exception to this is Melody Cottage (at operation Year 1 only) and seven properties around the A38 which were assessed as moderate significance due to the effects of visual changes and annual mean NO2 respectively (which is no worse than the assessment of the effects alone). For Melody Cottage, this will not be increased as a result of other effects acting and by year 15 the visual effect would be not significant due to the effects of screening."

11.1.3 This supplementary information takes account of the following:

- Update to the passenger and traffic forecasts and the year at which 12 mppa is reached in the Core Case (2030);
- Consideration of a Faster Growth Case (where 12 mppa is reached in 2027) and a Slower Growth Case (where 12 mppa is reached in 2034); and
- Additional projects which have the potential for cumulative effects with the Proposed Development.

11.1.4 In line with the original ES, the approach to the Cumulative Effects Assessment (CEA) is to distinguish between inter-project effects and inter-related effects, as follows:

- **Inter-project effects** - for each topic considered in this ES Addendum, an assessment is undertaken of how the environmental effects resulting from the Proposed Development could combine with the same topic-related effects generated by other proposed or committed developments to affect a common receptor. For example, noise generated by the construction of the Proposed Development and that generated from another construction site nearby could affect the same residential property receptor;
- **Inter-related effects** - this involves assessing whether any of the individual environmental topic effects resulting from the Proposed Development, which are not significant in their own right, could combine to create effects that are significant. For example, noise generated by the operation of the Proposed Development and views of it from nearby residential properties may individually not result in significant effects, though combined, they could result in a significant effect on residential amenity.

11.2 Inter-project effects

11.2.1 The assessment of inter-project effects has been undertaken in accordance with the Planning Inspectorate (PINS) Advice Note 17[136]. PINS guidance separates the search for 'other developments' in Stage 1 into three tiers reflecting the likely degree of certainty attached to each development, with Tier 1 being the most certain and Tier 3 the least certain. BAL is unaware of any additional Tier 3 developments having come forward, but additional Tier 1 and Tier 2 projects have been identified.

Additional projects

Park and Ride Facility

11.2.2 One additional Tier 2 project has been identified for inclusion in the CEA. This is for "*the change of use of land from gypsy pony track/agricultural land to use for a Park and Ride car park for Bristol Airport with 3101 parking spaces plus arrival/departure area with construction of associated roads and surfaces and the erection of a reception centre*" on land adjacent to Heathfield Park, Bristol Road, Hewish (Ref no: 20/P/2082/EA2). This project lies within the NSC local planning authority area.

11.2.3 The proposed park and ride facility would be located approximately 7km east of Bristol Airport, with an approximate distance by road of 12km from its location on the A370 via Downside Road. A planning application has yet to be submitted for this facility; however, NSC has provided an EIA Screening Opinion[1] in respect of the proposal and determined that the project is EIA Development. An EIA Scoping Opinion was subsequently provided by NSC on the 12 October 2020[2]

11.2.4 The supplementary cumulative impact assessment presented below considers the effects of this project, based on known information about the scheme presented in the EIA Scoping Opinion. A planning application for this proposed park and ride facility has not been submitted to date, however at such time that an application is submitted, it would need to be accompanied by a standalone EIA.

Public Transport Interchange

11.2.5 **Tables 18.2** and **18.3** in **Chapter 18** of the original ES outlined the proposals to be progressed under BAL's permitted development rights and those elements of the extant 10 mppa consent which had not commenced construction that were included in the CEA. This included the public transport interchange (PTI), consented as part of the 10 mppa application (see **Table 18.2** in the original ES).

11.2.6 BAL has subsequently brought forward proposals for a new PTI which has not yet been constructed. This is defined as a Tier 1 project in accordance with PINS guidance in Advice Note 17. BAL intends to deliver the PTI under its permitted development rights.

11.2.7 BAL has consent for a PTI on top of the proposed multi-storey car park (MSCP) 2 (formally known as MSCP1) as part of the 10 mppa permission. As a result of requests from NSC, BAL have agreed to decouple the PTI from MSCP 2 in order to accelerate delivery. The PTI facility would be brought forward on the site of the current drop off zone located in the northern part of the airport site. The

[136] Planning Inspectorate (2019). Advice note seventeen: Cumulative effects assessment relevant to nationally significant infrastructure projects, [online]. Available at: https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/2015/12/Advice-note-17V4.pdf [Checked 24 November 2020].

facility includes: a new PTI building; bus stands; vehicular access; relocated Drop-off Zone; a new taxi rank; a new substation; and new pedestrian routes.

11.2.8 The proposed PTI facility has been designed to maximise existing physical development such as hard standing and internal access roads and minimise the scale of construction and operational effects, and to avoid any consequential changes to the 12 mppa infrastructure design. In addition, the construction of the facility will be carried out in accordance with a range of statutory controls which will also apply to the Proposed Development to minimise effects on the environment.

11.2.9 BAL intends to progress this development under its permitted development rights pursuant to the Town and Country Planning (General Permitted Development) (England) Order 2015 (as amended) (GPDO) and in accordance with Condition F2 of Part 8 (Class F) of the GPDO, BAL notified NSC of its intention to undertake this permitted development on 29 October 2020. BAL also submitted a request to NSC on 29 October 2020 for an EIA Screening Opinion for the PTI. The request was accompanied by an EIA Screening Report which concluded that there would be no likely significant effects due to the construction and operation of the PTI, both alone and in-combination with other plans and projects, including the Proposed Development and, therefore, that the proposal is not EIA development.

11.2.10 The supplementary cumulative impact assessment presented below considers the effects of the proposed park and ride facility and the PTI.

Traffic and Transport

11.2.11 The original ES concluded that there were **no additional cumulative effects** over and above those reported in Chapter 6: Traffic and Transport of the original ES.

11.2.12 The assessment of traffic and transport presented in **Chapter 5** of the ES Addendum is based on the methodology and traffic flows presented in the Transport Assessment Addendum (**Appendix 5A**) and in this regard, inherently considers cumulative effects. **No significant** effects were identified as a result of the updated traffic forecasts.

11.2.13 As the Heathfield Park development has not yet submitted a planning application, the only publicly available information is the EIA Scoping Opinion. As such, there is insufficient information on the proposed Heathfield Park park and ride facility to carry out a detailed cumulative assessment of the traffic and transport effects. Whilst it is not expected to substantially increase the number of buses transporting passengers to the airport given the number of car parking spaces proposed, the facility does have the potential to undermine delivery of the objectives of Bristol Airport's Surface Access Strategy. Notwithstanding this, on the basis of currently known information, no additional cumulative traffic and transport effects are anticipated

11.2.14 The assessment presented in the original ES took account of the PTI in its location on top of MSCP 2 and the associated traffic flows. The new location of the PTI would still be capable of accommodating the level of buses / coaches and taxis required to cater for an expansion to 12 mppa. The temporary relocation of the drop-off zone to the site of the MSCP 2 will not affect the operation of the 12 mppa proposals because it will be moved to the upper storey of MSCP 2 in line with the approved layout for the 10 mppa permission. Relocation of the drop-off zone will result in a temporary loss of short stay and long stay car parking spaces which will be reinstated once MSCP 2 is constructed. The loss of car parking spaces is not expected to significantly affect traffic flows, and the provision of a fit for purpose PTI is expected to encourage greater public transport use in lieu of private vehicle use.

11.2.15 Until MSCP 2 and the associated internal road layout is constructed (as per the extant 10 mppa consent), traffic accessing the PTI and the drop-off zone would utilise the existing internal roads with some minor upgrades. When MSCP 2 and the associated internal road arrangements are

constructed as per the 10 mppa permission, access to and from the PTI will revert back to a two-way flow along North Side Road, connecting into the roundabout used to access MSCP 2.

11.2.16 The proposed PTI facility has been designed to maximise existing physical development such as hard standing and internal access roads and minimise the scale of construction and operational effects, and to avoid any consequential changes to the 12 mppa infrastructure design. As a result, there will be no significant cumulative adverse effects on traffic flows.

11.2.17 Overall, **no significant** cumulative effects are therefore anticipated.

11.2.18 The conclusions of the original cumulative effects assessment remain unchanged when taking account of the updated forecasts and additional projects.

Noise and Vibration

11.2.19 The original ES concluded that cumulative noise and vibration effects of 'other developments' together with the Proposed Development were considered to be negligible and **not significant**.

11.2.20 The additional traffic growth from 'other developments' has been accounted for in the modelling of traffic (**Chapter 5: Traffic and Transport** of the ES Addendum and the Transport Assessment Addendum in **Appendix 5A**), and therefore considered in the noise and vibration assessment presented in **Chapter 6** of the ES Addendum. No additional cumulative effects are anticipated.

11.2.21 **No significant** cumulative effects are anticipated as a result of the addition to the assessment of the proposed Heathfield Park park and ride facility, taking into account its nature, scale and location. Whilst the number of additional buses that may be associated with the facility's operation is not known, this is not expected to be at a level that would significantly affect road traffic noise.

11.2.22 The PTI facility would remain within the airport boundary and would not introduce any new receptors or worsen the effects of noise on existing receptors. The operation of the PTI would not result in any greater noise effects when combined with the Proposed Development. **No significant** cumulative effects are therefore anticipated.

11.2.23 The conclusions of the original cumulative effects assessment remain unchanged when taking account of the updated forecasts and additional projects.

Air Quality

11.2.24 The original ES concluded that there were no additional cumulative effects over and above those reported in **Chapter 8: Air Quality** of the original ES.

11.2.25 The additional traffic growth from 'other developments' has been accounted for in the modelling of traffic (**Chapter 5: Traffic and Transport** of the ES Addendum and the Transport Assessment Addendum in **Appendix 5A**), and therefore considered in the air quality assessment presented in **Chapter 7** of the ES Addendum. No additional cumulative effects are expected.

11.2.26 **No significant** cumulative effects are anticipated as a result of the proposed Heathfield Park park and ride facility given its nature, scale and location. Whilst the number of additional buses that may be associated with the facility's operation is not known, this is not expected to be at a level to significantly affect air quality due to road traffic.

11.2.27 The PTI facility would remain within the airport boundary and would not introduce any new receptors or worsen the effects of air quality on existing receptors such that potential cumulative effects may occur. The operation of the PTI facility would not result in any greater air quality effects when combined with the Proposed Development. **No significant** cumulative effects are therefore anticipated.

11.2.28 The conclusions of the original cumulative effects assessment remain unchanged when taking account of the updated forecasts and additional projects.

Landscape and Visual

11.2.29 The original ES concluded that there would be no significant cumulative landscape or visual inter-project effects. The landscape and visual assessment presented in the original ES is unaffected by the updated passenger and traffic forecasts and, therefore, there is no supplementary information presented in the ES Addendum to take account of.

11.2.30 Due to the distance and intervening topography between the proposed Heathfield Park park and ride facility and Bristol Airport, **no significant** cumulative landscape and visual effects are anticipated.

11.2.31 The PTI facility would result in a slight intensification of built development on the airport site; however, this will only in result in small-scale reinforcement of the existing role of Bristol Airport within the host Landscape Character Area (Broadfield Down Settled Limestone Plateau). There will be a minor benefit in removing the PTI infrastructure from the upper storey of MSCP 2 and placing this at ground level in the new location. **No significant** cumulative effects are therefore anticipated.

11.2.32 The conclusions of the original cumulative effects assessment remain unchanged when taking account of the updated forecasts and additional projects.

Land Quality

11.2.33 The original ES concluded that there would be no significant cumulative inter-project effects on land quality. The land quality assessment presented in the original ES is unaffected by the updated passenger and traffic forecasts and, therefore, there is no supplementary information presented in the ES Addendum to take account of.

11.2.34 **No significant** cumulative effects are anticipated with the proposed Heathfield Park park and ride facility due to the distance between the two development sites.

11.2.35 For the Proposed Development together with the PTI facility, a range of environmental measures will be incorporated to manage the potential for land quality effects during the construction and operational phases. All the identified measures are incorporated into the CEMP for the Proposed Development, and adherence to them will be a requirement of any planning conditions associated with the Proposed Development. **No significant** cumulative effects are therefore anticipated.

11.2.36 The conclusions of the original cumulative effects assessment remain unchanged when taking account of the updated forecasts and additional projects.

Biodiversity

11.2.37 The original ES concluded that there would be no significant cumulative inter-project effects on biodiversity. The biodiversity assessment presented in the original ES is unaffected by the updated passenger and traffic forecasts and, therefore, there is no supplementary information presented in the ES Addendum to take account of. As such, the original conclusion remains unchanged.

11.2.38 **No significant** cumulative effects are anticipated with the proposed Heathfield Park park and ride facility and the Proposed Development due to the distance between the two development sites. The park and ride facility and the Proposed Development are required to adhere to the North Somerset and Mendip Bat Special Area of Conservation (SAC) Supplementary Planning Document (SPD).

11.2.39 The new location of the PTI facility would not alter the ability of the Proposed Development to comply with the requirements of the SPD, as assessed in the original ES. **No significant** cumulative effects are therefore anticipated.

11.2.40 The conclusions of the original cumulative effects assessment remain unchanged when taking account of the updated forecasts and additional projects.

Surface Water and Flood Risk

11.2.41 The original ES concluded that there would be no significant cumulative inter-project effects on surface water and flood risk, specifically for the 'other developments' due to the environmental measures built into the Proposed Development, including the drainage systems. The surface water and flood risk assessment presented in the original ES is unaffected by the updated passenger and traffic forecasts and, therefore, there is no supplementary information presented in the ES Addendum to take account of. As such, the original conclusion remains unchanged.

11.2.42 **No significant** cumulative effects are anticipated with the proposed Heathfield Park park and ride facility and the Proposed Development due to the distance between the two development sites.

11.2.43 The proposed drainage solution for the PTI facility and associated works would be designed to meet the required standards of the NPPF and would incorporate suitable water quality management measures. This would ensure that the PTI facility is fully effective in managing the potential for aquatic environment, water resources and flood risk effects. Taking account of the nature and scale of the PTI facility and the embedded mitigation measures associated with the Proposed Development, **no significant** cumulative effects are anticipated.

11.2.44 The conclusions of the original cumulative effects assessment remain unchanged when taking account of the updated forecasts and additional projects.

Groundwater

11.2.45 The original ES concluded that there would be no significant cumulative inter-project effects on groundwater. The groundwater assessment presented in the original ES is unaffected by the updated passenger and traffic forecasts and, therefore, there is no supplementary information presented in the ES Addendum to take account of. As such, the original conclusion remains unchanged.

11.2.46 **No significant** cumulative effects are anticipated with the proposed Heathfield Park park and ride facility and the Proposed Development due to the distance between the two development sites.

11.2.47 The proposed location of the PTI facility will, like the Proposed Development, lie over the Bristol Airport Major Aquifer. Taking account of the embedded mitigation measures built into the PTI Facility and the Proposed Development, **no significant** cumulative effects are anticipated.

11.2.48 The conclusions of the original cumulative effects assessment remain unchanged when taking account of the updated forecasts and additional projects.

Historic Environment

11.2.49 The original ES concluded that there would be no significant cumulative inter-project effects on the historic environment in relation to the impact of the Proposed Development on the integrity and setting of designated heritage assets, and effects on archaeology. The historic environment assessment presented in the original ES is unaffected by the updated passenger and traffic forecasts and, therefore, there is no supplementary information presented in the ES Addendum to take account of. As such, the original conclusion remains unchanged.

11.2.50 **No significant** cumulative effects are anticipated with the proposed Heathfield Park park and ride facility and the Proposed Development due to the distance between the two development sites.

11.2.51 The new location of the PTI facility is on previously developed ground and as such it is unlikely that any archaeological remains would be present. Therefore, the Proposed Development will not result in any changes to the assessment of cumulative effects on archaeology presented in the original ES. Overall, due to the nature and scale of the PTI facility and its location within the airport site, **no significant** cumulative effects on the setting of designated heritage assets are anticipated together with the Proposed Development.

11.2.52 The conclusions of the original cumulative effects assessment remain unchanged when taking account of the updated forecasts and additional projects.

Socio-economics

11.2.53 The original ES concluded that there were no significant cumulative socio-economic effects, although positive cumulative effects for employment and the economy were identified due to cumulative job creation.

11.2.54 The updated socio-economics chapter (**Chapter 8** of the ES Addendum) has confirmed that the job creation and employment benefits resulting from the Proposed Development would be **significant beneficial.**

11.2.55 **No significant** cumulative effects are anticipated with the proposed Heathfield Park park and ride facility and the Proposed Development due to the nature and scale of the facility, including the potential job creation.

11.2.56 There may be a limited number of additional employment opportunities associated with the proposed PTI facility; however, the scale of any jobs creation will not be substantial and, therefore, **no significant** cumulative effects are anticipated.

11.2.57 The conclusions of the original cumulative effects assessment remain unchanged when taking account of the updated forecasts and additional projects.

Human Health

11.2.58 The original cumulative assessment concluded that there would be one beneficial inter-project effect of moderate significance on the collective health benefits from employment and investment from the 'other developments' in addition with the Proposed Development.

11.2.59 The updated health chapter (**Chapter 9** of the ES Addendum) has confirmed that the health benefits from employment and investment due to the Proposed Development would be **significant beneficial** and therefore this would not affect the original cumulative assessment conclusions.

11.2.60 The proposed Heathfield Park park and ride facility together with the Proposed Development would not alter the assessment of cumulative health effects due to the nature, scale and location of the facility and, therefore, **no significant** cumulative effects are anticipated.

11.2.61 Consideration has been given above to those factors which feed into the assessment of cumulative health effects, including air quality, traffic and employment opportunities. The assessments have concluded that the PTI facility, together with the Proposed Development, would not result in any significant effects. On this basis, **no significant** cumulative effects are predicted when considering the proposed PTI facility with the Proposed Development.

11.2.62 The conclusions of the original cumulative effects assessment remain unchanged when taking account of the updated forecasts and additional projects.

Carbon and Greenhouse Gases

11.2.63 The assessment in **Chapter 10** of this ES Addendum can be regarded as a cumulative assessment as the national and local GHG emissions budgets and targets used for contextualisation are in place regardless of future trends such as airport development and demand change, technology development and population change. Therefore, a separate CEA of GHG emissions has not been undertaken as part of this ES Addendum. The Carbon and GHG emissions assessment presented in **Chapter 10** of the ES Addendum has confirmed that there would be no significant effects as a result of the Proposed Development.

11.3 Inter-related effects

11.3.1 The original ES concluded that the combination of the changes in air quality, noise, vibration, visual, land quality, water quality and flood risk for most of the individuals on and surrounding the application site would in general result in minor effects that are not significant. At seven properties around the A38, this was reported as an effect of **moderate significance** due to the significant effects of annual mean NO_2. At Melody Cottage, this also reported as an effect of **moderate significance** due to the significant effects of visual changes.

11.3.2 The revised air quality assessment no longer reports moderate adverse (significant effects) on the seven properties on the A38 and therefore the inter-related effects on these receptors are now **not significant** (see **Section 7.7** of **Chapter 7: Air Quality**)

11.3.3 The previously identified **moderate adverse significant** inter-related effect on Melody Cottage at Year 1 remains because the landscape and visual impact assessment conclusions have not changed. By year 15 the inter-related visual effect would be **not significant** due to the effects of screening.

11.3.4 Supplementary information has been provided to inform the assessment of inter-related noise effects. As part of the original ES process, NSC requested that cumulative noise levels for air noise, ground noise and road traffic noise were presented for key receptors, despite this being a non-standard approach. This analysis has been repeated using the updated forecasts and the results are presented in **Table 11.1** below.

Table 11.1 Cumulative noise levels

Scenario	Noise Source	Noise Level at Location							
		Day Noise Level, dB $L_{Aeq,16h}$				Night Noise Level, dB $L_{Aeq,8h}$			
		A	B	C	D	A	B	C	D
2017	Air	61	60	62	51	56	54	57	46
	Ground	61	58	52	45	56	52	46	39
	Road	39	62	55	44	33	54	47	38
	Total	**64**	**65**	**63**	**53**	**59**	**58**	**57**	**48**
10 mppa (2024)	Air	61	60	62	51	56	54	56	46

Scenario	Noise Source	Noise Level at Location							
	Ground[1]	62	59	53	46	59	53	49	40
	Road[1]	42	64	58	47	36	55	50	40
	Total	**65**	**66**	**64**	**53**	**60**	**59**	**58**	**48**
10 mppa (2030)	Air	61	59	61	51	56	55	57	46
	Ground	62	59	53	46	59	53	49	40
	Road	42	64	58	47	36	55	50	40
	Total	**64**	**66**	**64**	**53**	**60**	**59**	**58**	**48**
12 mppa (2030)	Air	60	58	60	50	55	54	56	45
	Ground	63	52	53	46	60	47	48	41
	Road	42	64	58	47	36	55	50	40
	Total	**65**	**65**	**63**	**53**	**61**	**58**	**58**	**47**

Note 1 – for ground and road noise, predictions for 10 mppa in 2024 have not been carried out; the noise levels for these sources have been assumed to be the same as for 10 mppa in 2030.

11.3.5 The conclusion from the original ES remains valid. This was that all changes in the cumulative levels were less than 2 dB(A) and therefore would not be considered significant.

11.3.6 The updated passenger and traffic forecasts have not changed the conclusions regarding the significance of effects for any of the other topic in the ES Addendum and therefore there are no other changed or new inter-related effects.

11.4 Faster and Slower Growth Cases

11.4.1 **Chapters 5 – 10** of the ES Addendum have used a Core Case of 2030 as the date at which 12 mppa would be reached. Each topic has also carried out a sensitivity test to confirm if reaching 12 mppa faster (2027) or slower (2034) than the Core Case (2030) would affect the conclusions of the Core Case assessment.

11.4.2 All sensitivity tests have concluded that the effects would not alter if passenger growth came faster or slower and would therefore not affect the significance conclusions. On this basis, the conclusions of the supplementary cumulative assessment (inter-project and inter-related effects) presented in **Sections 11.2 and 11.3** of the ES Addendum would not alter in the faster or slower growth cases.

11.5 Conclusions of Significance Evaluation

11.5.1 The original ES concluded that there were no significant adverse inter-project effects anticipated from the Proposed Development together with other developments screened into the assessment. There was one beneficial inter-project effect of moderate significance on the collective health benefits from employment and investment from the 'other developments' in addition with the Proposed Development. No changes to these conclusions have been identified when taking account of the supplementary information presented in **Chapters 5-10** of the ES Addendum, and the additional other developments (**section 1.2**).

11.5.2 The original ES concluded that the combination of the changes in air quality, noise, vibration, visual, land quality, water quality and flood risk for most of the individuals on and surrounding the application site would in general result in minor effects that are not significant. At seven properties around the A38, this was reported as an effect of **moderate significance** due to the significant effects of annual mean NO_2. At Melody Cottage, this also reported as an effect of **moderate significance** due to the significant effects of visual changes.

11.5.3 The revised air quality assessment no longer reports moderate adverse (significant effects) on the seven properties on the A38 and therefore the inter-related effects on these receptors are now **not significant** (see **Section 7.7** of **Chapter 7: Air Quality**)

11.5.4 The previously identified **moderate adverse significant** inter-related effect on Melody Cottage at Year 1 remains because the landscape and visual impact assessment conclusions have not changed. By year 15 the inter-related visual effect would be **not significant** due to the effects of screening.

11.5.5 The updated passenger and traffic forecasts have not changed conclusions regarding the significance of effects for any of the other topic assessments (see **Chapters 5 – 10** of the ES Addendum) and therefore there are no other altered or new inter-related effects.

12. Summary

12.1.1 This Environmental Statement (ES) Addendum has been prepared to supplement the original ES provided with the planning application for the proposed development of Bristol Airport to accommodate 12 million passengers per annum (mppa). The passenger and traffic forecasts that informed the 12 mppa planning application and provided the basis for the original ES have been updated in order to consider the effect of the COVID-19 pandemic and address the uncertainties associated with the rate at which demand will return. The ES Addendum is supplementary information which takes account of the updated forecasts and should be read alongside the original ES provided with the planning application.

12.2 Topics Scoped Out of the ES Addendum

12.2.1 The topics outlined in **Table 12.1** below were scoped out of the ES Addendum on the basis that the passenger and traffic forecasts do not underpin these assessments. No supplementary information is provided in the ES Addendum in relation to these topics, and the assessment conclusions for these topics set out **Table 19.1** in **Chapter 19** of the original ES remain valid.

Table 12.1 Scope of ES Addendum

Topic (Original ES 2018)	Original conclusion of significance (Original ES 2018)	Change in significance of effects (November 2020)
Chapter 9: Landscape and Visual	No significant adverse landscape effects were identified in the original assessment (see summary in **Table 9.10** in **Chapter 9** of the original ES). A summary of significance of visual effects is presented in **Table 9.11** in **Chapter 9** of the original ES. This confirmed that the majority of visual receptors would not experience significant effects as a result of the proposed development with the exception of 'Melody Cottage' which is anticipated to experience moderate and significant effects in Year 1. By year 15 the visual effect would be not significant due to the effects of screening	None. The revised passenger and traffic forecasts will not alter the nature or scale of the physical infrastructure proposed as part of the development and no changes to the mitigation and enhancement measures identified in the ES are proposed. In consequence, no changes to the significance of landscape or visual effects identified in the original ES will occur.
Chapter 10: Land Quality	No significant effects on humans, property, controlled waters or soil were identified in the original ES (see summary in **Table 10.10** of **Chapter 10** of the original ES).	None. The revised passenger and traffic forecasts will not alter the nature or scale of the physical infrastructure proposed as part of the development or the proposed mitigation measures and therefore there is no change to the significance of effects on land quality during operation reported in the original ES.
Chapter 11: Biodiversity	**No significant** effects on biodiversity were identified in the original ES; however, the conclusion in relation to the effects on	None.

Topic (Original ES 2018)	Original conclusion of significance (Original ES 2018)	Change in significance of effects (November 2020)
	Greater and Lesser Horseshoe bats in their own right and as qualifying features of the North Somerset and Mendip Bat SAC is reliant on the delivery of replacement off-site bat habitat in compliance with the North Somerset and Mendip Bat SAC SPD (see **Section 11.17** in **Chapter 11** of the original ES).	The revised passenger and traffic forecasts will not alter the nature or scale of the physical infrastructure proposed as part of the development nor operation of the airport and, therefore, effects on biodiversity including habitat loss will remain the same. No changes to the mitigation and enhancement measures identified in the ES are proposed including the commitment to deliver replacement off-site habitat. As such, there is no change to the significance of the effects during operation reported in the original ES.
Chapter 12: Surface Water and Flood Risk	**No significant** effects were identified in relation to the impact of the Proposed Development on the aquatic environment (surface water), water resources, or flood risk (see **Table 12.14** in **Chapter 12** of the original ES).	None. The revised passenger and traffic forecasts will not alter the nature or scale of the physical infrastructure proposed as part of the development or the proposed mitigation measures and therefore there is no change to the significance of effects on surface water and flood risk during operation reported in the original ES.
Chapter 13: Groundwater	**No significant effects** were identified in relation to the impact of the Proposed Development on groundwater, including the principal aquifer the Chelvey Well Public Water Supply and springs or baseflow to surface water (see **Table 13.13** in **Chapter 13** of the original ES).	None. The revised passenger and traffic forecasts will not alter the nature or scale of the physical infrastructure proposed as part of the development or the proposed mitigation measures and therefore there is no change to the significance of effects on groundwater during operation reported in the original ES.
Chapter 14: Historic Environment	**No significant effects** were identified in relation to the impact of the Proposed Development on heritage assets, including Windmill House Grade II listed building, and the Scheduled Monuments located in the study area (see **Table 14.13** in **Chapter 14** of the original ES).	None. The revised passenger and traffic forecasts will not alter the nature or scale of the physical infrastructure proposed as part of the development or the proposed mitigation measures and therefore there is no change to the significance of effects on the historic environment during operation reported in the original ES.

12.3 Topics scoped into the ES Addendum

12.3.1 The topics outlined in **Table 12.2** below were scoped into the ES Addendum as the respective assessment and conclusions regarding the significance of effects of the Proposed Development

may be affected by the updated passenger and traffic forecasts. Supplementary information is provided in **Chapters 5 – 11** of the ES Addendum in relation to these topics. **Table 12.2** confirms whether the conclusions set out **Table 19.1** in **Chapter 19** of the original ES remain valid when taking account of the supplementary information.

Table 12.2 Summary of ES Addendum Conclusions

Topic	Significance conclusion (Original ES 2018)	Change in significance conclusion (ES Addendum 2020)
Traffic and Transport	**No significant adverse** traffic and transport effects were identified in the original assessment (see summary in **Table 6.32** in **Chapter 6** of the original ES). **Moderate/major significant beneficial** effects were identified due to improvements in driver delay on Junction 4a A38 / Downside Road and Junction 4b A38 West Lane as a result of the proposed highways improvements and junction upgrades.	The supplementary assessment has concluded that there would be **no significant adverse** traffic and transport effects as a result of the Proposed Development (see **Chapter 5** of the ES Addendum). The proposed highways and junction improvements remain unchanged, and the effect of these improvements remains **moderate / major significant beneficial.** The conclusions regarding significance are unchanged from the original ES
Noise and Vibration	**No significant** effects were identified in the original assessment in relation to air noise and vibration, ground noise and road traffic noise (see **Table 7.57** in **Chapter 7** of the original ES).	The supplementary assessment has concluded that there would be **no significant adverse** effects in relation to noise and vibration (see **Chapter 6** of the **ES Addendum**). The conclusions regarding significance are unchanged from the original ES
Air Quality	**Localised and moderate significant adverse** effects were identified, with impacts at seven receptors close to the A38 being classified as "moderate" in the original assessment for annual mean NO_2 (although concentrations would remain below national Air Quality Objectives (AQO) - see **Table 8.33** in **Chapter 8** of the original ES). No other significant effects were identified.	The supplementary assessment has concluded that there would be **no significant adverse** effects in relation to air quality (see **Chapter 7** of the **ES Addendum**). **This conclusion is different to the original ES which identified that there would be a moderate significant effect**. The principal reasons for this change relate to the use of the most up to date emission factors for road vehicles and traffic modelling within the updated assessment presented in the ES Addendum (**Chapter 7**).
Socio-economics	**No significant adverse** effects were identified in the original assessment in relation to socio-economics. **Major significant beneficial** effects were identified as a result of employment and GVA effects during the operational phase of the Proposed Development for North Somerset, the West of England sub-region, and the	The supplementary assessment has concluded that there would be **no significant adverse** effects in relation to socio-economics (see **Chapter 8** of the **ES Addendum**). The supplementary assessment has concluded that the beneficial effects of the Proposed Development in terms of the increases in employment and GVA for North

Topic	Significance conclusion (Original ES 2018)	Change in significance conclusion (ES Addendum 2020)
	South West and South Wales regions (see **Table 15.26** in **Chapter 15** of the original ES).	Somerset, the West of England sub-region, and the South West and South Wales regions would be reduced, but the conclusion of **major significant beneficial** effects remains unchanged. The conclusions regarding significance are unchanged from the original ES.
Health	**No significant adverse** health effects were identified in the original assessment (see **Table 16.11** in **Chapter 16** of the original ES). **Moderate significant beneficial** effects were identified in relation to economic and employment opportunities.	The supplementary assessment has concluded that there would be **no significant adverse** effects in relation to health (see **Chapter 9** of the **ES Addendum**). The supplementary assessment has concluded that the beneficial health effects of the Proposed Development due to economic and employment opportunities would be reduced, but the conclusion of **moderate significant beneficial** effects remains unchanged. The conclusions regarding significance are unchanged from the original ES
Carbon and Greenhouse Gases	**No significant adverse** effects were identified in the original ES in relation to carbon and greenhouse gases (see **Table 10** in **Chapter 17** of the original ES).	The supplementary assessment has concluded that there would be **no significant adverse** effects in relation to carbon and greenhouse gases (see **Chapter 10** of the **ES Addendum**). The conclusions regarding significance are unchanged from the original ES
Cumulative Effects	**No significant adverse** inter-project effects were identified in the original ES. One **significant beneficial** inter-project effect in relation to the collective health benefits of employment and the economy was identified (see **paragraph 18.7.1** in **Chapter 18** of the original ES). The original ES concluded that the combination of the changes in air quality, noise, vibration, visual, land quality, water quality and flood risk for most of the individuals on and surrounding the application site would in general result in minor effects that are **not significant**. At seven properties around the A38, this was reported as an effect of **moderate significance** due to the significant effects of annual mean NO2. At Melody Cottage, this also reported as an effect of **moderate significance** due to the significant effects of	**No significant adverse** inter-project effects were identified in the original ES. Although the collective health benefits of employment and the economy are reduced from the original ES, the inter-project effects will remain **significant beneficial** (see **Chapter 11** of the ES Addendum). The previously identified **moderate adverse significant** inter-related effect on Melody Cottage remains because the landscape and visual impact assessment conclusions have not changed (see **Chapter 11** of the ES Addendum). By year 15 the inter-related visual effect would be **not significant** due to the effects of screening. The revised air quality assessment no longer reports **moderate adverse (significant effects**) on the seven properties on the A38 and therefore the inter-related effects on

Topic	Significance conclusion (Original ES 2018)	Change in significance conclusion (ES Addendum 2020)
	visual changes (see **paragraph 18.7.2** in **Chapter 18** of the original ES).	these receptors are now **not significant** (see Section 7.7 of Chapter 7: Air Quality).

12.3.2 The supplementary assessment presented in this ES Addendum has concluded that the updated passenger and traffic forecasts have not introduced any new significant adverse effects in comparison to the original ES (see **Table 12.1**). However, taking into account the latest vehicle emissions factors and traffic modelling, the supplementary assessment has concluded that there are now **no significant adverse** effects associated with the Proposed Development on air quality (see **Table 12.1** and **Chapter 7** of the ES Addendum). This has had a resultant impact on the assessment of inter-project effects (**Table 12.1** and **Chapter 11**) where the effects on seven properties along the A38 are no longer significant. The significant inter-related (visual) effect on Melody Cottage during Year 1 identified in the original ES remains. By year 15 the inter-related visual effect would be **not significant** due to the effects of screening.

12.3.3 The **significant beneficial effects** of the Proposed Development in respect of health and socio-economics identified in the original ES remain unchanged. This principally reflects the substantial employment and GVA benefits associated with increasing the capacity of Bristol Airport to accommodate 12 mppa.

12.3.4 The ES Addendum has also given consideration to the impact of faster (where 12 mppa is reached in 2027) or slower (where 12 mppa is reached in 2034) passenger growth, in comparison to the Core Case (12 mppa at 2030) assessed within the Addendum. This sensitivity test has concluded that faster or slower growth would not affect the conclusions of the ES Addendum regarding the likely significance of effects of the Proposed Development summarised in **Table 12.1**.